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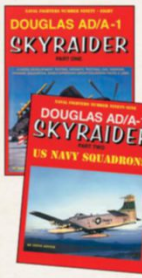
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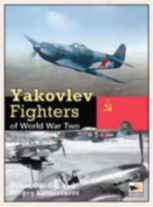
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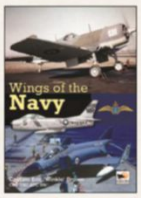
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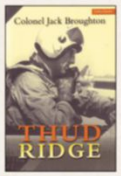
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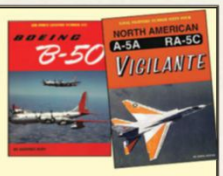
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ON THE COVER: Although relatively benign-looking, the Douglas SBD Dauntless proved to be one of the most effective weapons in the Pacific Theater. It sank a disproportionate number of enemy carriers and major combat vessels. (Photo by John Dibbs/planepicture.com)
THIS PAGE: The wood-and-fabric de Havilland DH.89 Dragon Rapide was an effective short-haul transport in England during World War II, but its fragile structure meant that few would survive until today. During the war, the windows were whitewashed so that German spies couldn't view U.K. military facilities while posing as passengers. (Photo by John Dibbs/planepicture.com)



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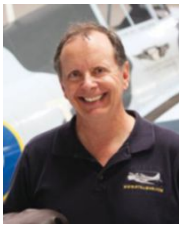
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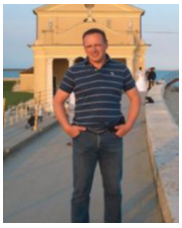




The Douglas Dauntless remains a personal icon. My father and I restored and flew the only airworthy example in the early 1970s, and the SBD was the subject of my first book in 1976. It's still in print 40 years later. In researching other books and articles, I knew several SBD pilots and aircrew, most of whom have departed the pattern. But their vital contribution to victory in World War II remains unexcelled.

Tom Cooper

Evaluating Russian Airpower





I grew up listening to and reading stories about the then Soviet Union launching Operation Kavkaz—a military intervention in Egypt in 1970. Forty-five years later, the Russians are back, this time in Syria. Considering all the announcements about ever more advanced variants of their superjets, however, they're still flying aircraft types that were enigmas even in the late 1980s, and I felt compelled to explain the Russian Air Force as it now exists.

Aviation Insider/The Russians in Syria

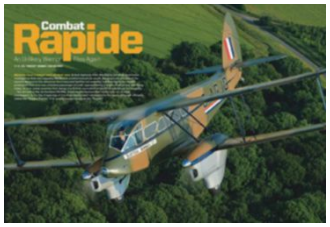


As a warfare analyst, I spend my days sifting through literally hundreds of documents and emails from my contacts all over the world, and I'm always struck by the difference between what those on the scene are reporting versus what passes for news these days. So given what is being said about the Syrian/Iraqi actions, I felt compelled to explain what is actually happening versus what the popular press says is happening.

Lt. Col. "Cricket" Renner, USAF, Retired

Combat Rapide: An Unlikely Warrior Flies Again



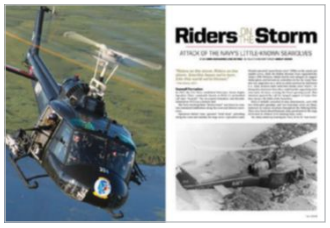


While living in England, I often visited Duxford, a grass airfield with a unique historical aura. I loved watching the occasional Spitfire fly around the pattern, but I also noticed a biplane regularly loading up with passengers and flying around Cambridge. It would land, load another group of passengers, and keep going. This was the Dragon Rapide, a British 1930s' passenger airplane, and I recently discovered that the type also had some unusual wartime encounters.

James P. Busha

Riders on the Storm: Attack of the Navy's Little-Known Seawolves





No one will argue the fact that Vietnam was primarily a helicopter war. Yes, the fighters—both jets and props—along with the massive B-52 bombers provided lasting souvenirs in the form of bomb craters that pockmark the countryside today. But it was the helicopters—primarily, the olive drab Hueys—that visually remind us of the down-and-dirty air war that allowed many of us to watch the war in color while enjoying our nightly dinner. But the Hueys also came in blue, thanks to the unsung and lesser known U.S. Navy Seawolves that rewrote history as their accomplishments became the stuff of legend.

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So Much to Know, So Little Time to Learn

BY **BUDD DAVISSON**



The Seawolf Hueys were armed to the teeth—gunships in every sense of the word. (Photo courtesy of EAA)

I'm fairly convinced that I'm going to die knowing absolutely nothing about aviation. This after spending something on the far side of half a century deeply involved in most phases of aviation. I came to this conclusion while assembling this issue: It was absolutely amazing how many times I said to myself, "Hmm…I didn't know that!"

One glaring example of new knowledge was the result of reading "Riders on the the Storm," Jim Busha's article on the Seawolves, or HA(L)-3, in Vietnam. First, I'm not sure I even knew that the U.S. Navy was flying Hueys in 'Nam. I am, however, absolutely certain that I'd never heard of the Seawolves, an airborne strike force of Huey gunships that floated around in rivers waiting to be called in to support the PBRs (patrol boats, river) as they tried to cleanse the streams of Viet Cong. Using converted barracks ships (boats, actually) as makeshift aircraft carriers, the Mekong Delta was their world as they provided fire support to any unit needing it. Fascinating story!

When we were sitting around coming up with articles for this issue, we began musing about how Russia had inserted itself into the Syria/Iraq mess, and we asked the question, "Does the Russian air force still exist, and what kind of shape is it in?" So we contacted Tom Cooper, our Middle East/Russia analyst, and he fed us lots and lots of info, much of which was news to us. Figuring that many readers don't know much more about the Russian air force than we do, he put together "Evaluating Russian Airpower," in which we try to draw an accurate image of the current Russian aerial fighting force.

Following the rundown of Russian aircraft, we brought Tom into Aviation Insider and had him cut through the media's heavy layer of inaccuracies to tell us exactly what is happening over there. As things develop in the future, he'll be back from time to time to fill us in.

One of the minor, but still interesting, facts that I picked up from this issue was the way the Brits covered the windows of DH Rapides doing transport duty in England during World War II. They didn't want spies to see military installations from the air, so they simply whitewashed the windows while running passengers around England. That was, however, of no use when a Rapide stumbled onto a Heinkel He 111 coming out of the clouds and the most unusual dogfight of WW II ensued. You can read about it in "Cricket" Renner's article, "Combat Rapide."

One fact in this issue that I did know is that the Douglas SBD Dauntless, which many consider to be the hero of Midway, far outperformed her appearance: She looks anything but threatening. However, with her nose down and her dive brakes out, she could put a 1,000-pound bomb on target as surely as a sniper could place his rounds. That accuracy in the hands of young, aggressive pilots sent four enemy carriers to the bottom of the sea during that one battle. Barrett Tillman, who came of age in the back seat of his father's Dauntless, gives readers an exacting tour of the old girl in his article "SBD Dauntless: Winged Excalibur."

Barrett also tackles the mess that is the Medal of Honor in a special Tailview. Considering that the Medal of Honor is our nation's highest military honor, you'd think that the government would have its act together about awarding it, but that, apparently, is not the case.

I hope ya'll learn as much reading this as I did editing it. It's a fun issue!

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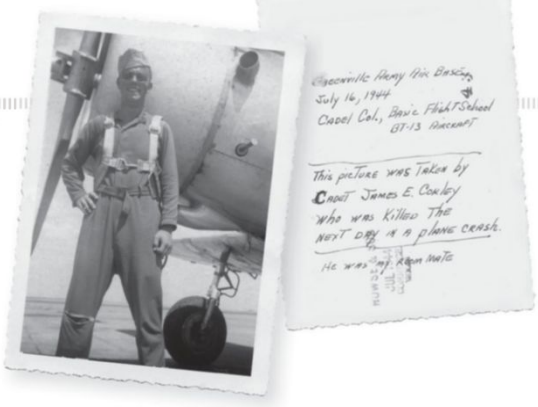


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The Sad Side of WW II Flight Training

Your story "They Weren't All Fighters" (February 2016) addressed the acceptable loss rate of people and equipment for training. I thought you might like to see this picture, front and back (photo, above). This picture is quite poignant, showing in our father's handwriting, about his roommate, Cadet James E. Corley. Great magazine with excellent stories. Thank you.

Charlie McClure

A sad piece of family history. Thanks for forwarding it. BD

Dad Never Got a Choice

My dad enlisted in the USAAC in March 1941 and was trained as an aircraft mechanic. As a corporal and just 19, he applied for pilot training and started the same month that he turned 20! He flew PT-17s (his first airplane ride!), then BT-13s, and finally AT-6s out in Stockton, California. The "hot rumor" was that half of his Class of 42-I was going to fighters and half to bombers. At 6 feet 5 inches, he knew he wasn't going to fighters, but he was hoping for A-20s or maybe B-25s. On the day that the new pilots found out their next training assignments, he and five others got their orders to report to Kansas City, Missouri, to attend DC-3/C-47 school with TWA! No bombers!

He flew for 16 more years but did squeeze in some time in B-25s and a few in a B-24 that was a war-weary aircraft. As an operations officer, he could fly anything on the field, and he really enjoyed flying the T-6 to get his flying hours in.

Thanks for a great article!

Gary Moline
Fort Lauderdale, FL

At least he got to fly. Many more washed out! BD

Left Out the "Weasels": Our Bad!

As usual, I have read the December 2015 issue from cover to cover and was not disappointed but for one exception.

I found the cover story about the "Phantom" to be very informative; however, you missed a very important piece of what must have been a very complicated puzzle to try to put together. I'm referring to the F-4 as used in the "Wild Weasel" mission. You mentioned the "Weasel" mission in the caption of a picture of the F-4G. But other than that, not so much.

The F-4C "Weasel" played a very important role both in combat over North Vietnam (67th TFS) and during the Cold War period. During this time, the F-4C "Wild Weasel" was the only "Weasel" asset in USAFE (81st TFS) and after the "Thud" was withdrawn from SEA, the only asset in PACAF (80th TFS at Yokota AFB, Japan; later the 67th TFS at Kadena AFB, Okinawa). As a "Weasel Bear," EWO/back seater in the F-105F (100 missions North), the F-4C, and the F-4G, I find this to be a big omission.

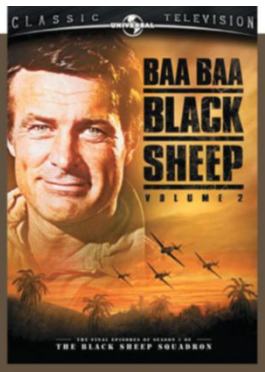
And don't forget the role the F-4G "Weasel" played in the SEAD Mission from 1978 to the last combat missions for U.S. F-4s in the very capable hands of USAF "Wild Weasel Crews" in Gulf War 1.

However, having said all this, I admit you attempted to condense a segment of the long history of a fabulous war machine into a magazine article, where many volumes that attempted to do the same thing have all fallen short in one way or another. My congratulations on a valiant effort. May I suggest an article on the F-4 "Wild Weasels"?

It was a pleasure to read your article. It brought back many memories—some good, some not. "First in, Last out. YGBSM."

Maj. F. Lee "T. R." Marino, USAF, Retired

We agree with you: We need to do a dedicated "Wild Weasel" article. Any "Weasel" crewmen reading this, please drop us a line and we'll put one together. It was a unique mission, which is seldom recognized. BD



On Movie Inaccuracies

I share your view on inaccuracies in Hollywood productions. Maybe I can give you an excuse. I was the first active-duty Marine to be technical advisor on the television show *Baa Baa Black Sheep*. Col. Greg Boyington was listed as the technical advisor, as it should be; it was his life and book. I provided the details sometimes overlooked by those above the rank of captain. The production company rounded up seven F4Us. One was an F4U-7 made exclusively for the French Navy; the original logbook showed service in French Indochina. The company found, at that time, a flying Zero, but due to the Gun Control Act of 1968, it became against the law to bring a gun platform into the United States. Thus, we too had to use painted up T-6s. I know how you feel, but I hope this helps a wee bit. Semper Fi.

Master Sgt. Dub Allen, USMC, Retired

Interesting info, Dub. Thanks. BD

Eric and Hanna



I read with great interest about Hanna Reitsch, especially the part about her meeting with Eric Brown after the end of WW II. Eric Brown was, actually, a captain in the Royal Navy Fleet Air Arm and is credited with having flown 478 different types of aircraft, more than anyone else in history. He is also credited as the first to land a jet on an aircraft carrier.

George Rowland
Port Byron, IL

Nice Article Mix!

"Luftwaffe's Femmes Fatales"—terrific article. I always wondered what happened to Hanna Reitsch postwar. Likewise, terrific article on Walter Boyne. No more than an hour after reading the article, while going through and organizing my vast magazine collection in preparation for donation, what did I come across but an article in the November 1967 *Air Classics* on the A-12 Shrike by...drum roll...Walter Boyne! Finally, I think the restored Blenheim is actually largely a Bollingbrook—got to give the Canucks full marks!

John Mitchell

Aviation has so much history that our biggest problem in each issue is deciding what to leave out. BD



Wrong Country

In your last issue of *Flight Journal*, page 24: "...a Curtiss P-40F...was based in Tunis, Libya." Tunis was and is the capital of Tunisia, at the time a French protectorate.

Jean Proyet

Sorry, Jean. That's what we get for believing the words penciled on the print during WW II. BD

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A Conquered Warrior: A digital image at the right price...free!

High-quality color photos of Luftwaffe aircraft are seldom seen because the Germans didn't have Eastman Kodak to provide them with color film. In fact, this image of a FW 190D-9 (or TA-152, if you prefer) was shot on good old American Kodachrome at Freeman Army Airfield in Indiana, where a huge number of German aircraft were based while their flying characteristics were evaluated. Some of the Freeman Field aircraft wound up in museums, but most were scrapped, a tragedy of the highest order. This image is available on FlightJournal.com and is suitable for printing or for use as wallpaper.

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SBD Dauntless

Winged Excalibur

THE DIVE-BOMBING HERO OF MIDWAY

BY **BARRETT TILLMAN**



Ed Heinemann's design of elegant simplicity is evident in this beautifully composed shot, showcasing the Dauntless's clean lines. (Photo by John Dibbs/ planepicture.com)

Tennyson wrote of King Arthur's magnificent sword Excalibur. The mysterious Lady of the Lake had toiled a full nine years to forget the magical weapon as a coronation present for the young monarch, that he might drive the heathen enemy from the land.

Excalibur was the finest weapon of its kind ever known to Camelot or any other kingdom. On one side of the blade was engraved in an ancient language, "Take me," and on the other, "Cast me away!"

The king, much distressed at the thought of losing Excalibur, turned to the sage Merlin and asked why he must do such a thing.

Merlin, infinite in his wisdom, replied, "Take thou and strike! The time to cast away is yet far off."

A Sunday Surprise

The 18 scout bombers approached Oahu that Sunday morning, flying in pairs to cover the Eastern Hemisphere from their carrier, USS *Enterprise*. "The Big E" had just delivered Marine Corps fighters to Wake Island, and Vice Adm. W. F. Halsey was taking no chances. He had operated his task force on a war footing since the previous month, even when returning to Hawaiian waters.

Cmdr. Howard Young was approaching Pearl Harbor at about 0800 when he saw a fighter initiate a pass at his Douglas SBD-3. The air group commander recognized a good gunnery run, mentally complimenting the brash U.S. Army pilot while resenting the intrusion.

Then the Mitsubishi Zero opened fire.

It was December 7, 1941, and the United States was suddenly, inexorably at war with Japan.

Young heard the high-pitched pings as 7.7mm rounds struck his Dauntless. He shoved everything forward with his left hand, nudged the stick downward, and dived for Ford Island. He had no time to call a warning to his other pilots, but they quickly learned the facts for themselves.



Radiomen on *Enterprise* heard a call from Ensign Manuel Gonzalez. "Please don't shoot! This is an American plane!" Nothing more was heard from him.

Lt. Clarence Dickinson of Scouting Squadron Six was flying his last sortie with his gunner, Radioman William Miller, who was due to leave the squadron. In a short-sharp fight, the Dauntless crew traded gunfire with three or more black-nosed assailants, and Miller reported hitting one. Then Miller called that he was hit and fell silent.

Dickinson reported, "I looked aft and saw a Japanese plane on fire slowly losing speed and altitude…I was able to get in two short bursts from my fixed guns as one enemy aircraft pulled ahead.

"My left tank being on fire and my controls being shot away, I told the gunner to jump. The plane went into a right spin at about 1,000 feet. When it started to spin, I made the necessary preparations and jumped. My parachute functioned normally, and I landed unhurt in the vicinity of Ewa Field."

Bill Miller never got out of the Dauntless called 6-S-4.

In all, seven Big E SBDs were shot down or crash-landed. The ship launched an abortive search for the six Japanese carriers, which got away clean. But not so the Big E: She lost four F4F Wildcats and three pilots trying to get into Pearl Harbor.

In less time than the United States or Japan expected, the Douglas Dauntless would become the worst enemy of the Japanese Imperial Navy.

Building a Champion

Edward H. Heinemann was the master wingsmith at Douglas Aircraft in El Segundo, California. Beginning in the 1920s, he worked for various aircraft companies, starting as a draftsman, but along the way, he became largely a self-taught engineer. His intuitive grasp of aircraft design and construction led to greater responsibility, and he became Douglas's chief engineer when the firm acquired Northrop's current projects in 1936. The BT-1 was a U.S. Navy dive-bomber that showed the SBD's pedigree: an all-metal monocoque structure with perforated dive and landing flaps to retard speed in the Navy's steep attack profile. Only 54 were built, but under Heinemann's direction, they pointed the way to the future—and the road to Tokyo.

The modified BT-1 was first designated BT-2,



The SBD's two-man crew of pilot and radioman-gunner made a potent team, often holding their own in combat against faster, heavier-armed Mitsubishi Zeroes. (Photo by John Dibbs/planepicture.com)



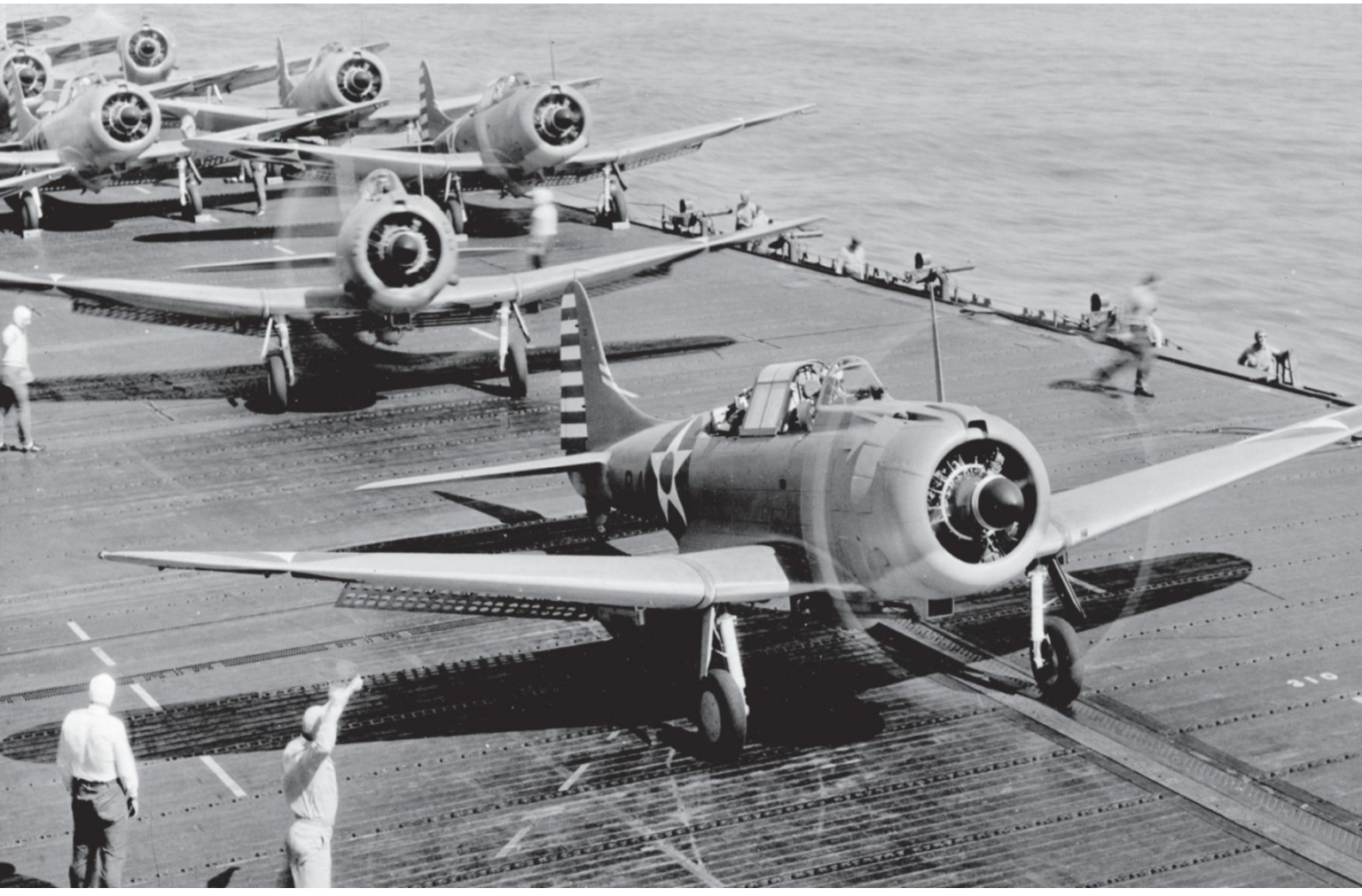
but the Navy changed the designation to reflect the new firm's commitment: "SBD" for "Scout Bomber by Douglas." Production began at El Segundo in 1940, and contrary to the usual procedure, the Marine Corps received the first aircraft, as SBD-1s had less internal fuel than follow-on models. But all used the proven Wright R-1820 Cyclone, eventually rated at 1,200hp.

Heinemann lauded his El Segundo team, which often worked overtime to deliver SBDs and "keep 'em flying." He especially cited production supervisor Eric Springer, whose shop could deliver a dozen a day; project engineers Robert Anderson and John Kosco; and Lillian Heinemann who typed the pilot's manual.

Navy scout and bomber squadrons began exchanging their BTs and biplane Curtiss SBCs for SBD-2s in 1941. That October, the Navy assigned

Above: **A Marine Corps SBD–3 based at Guadalcanal in 1942–43, bearing typical markings of the period. (Illustration by Tom Tullis)**

Below: **Spotted for launch, this SBD–3 was part of CV–6's Task Force 8 and the USS *Enterprise*'s first combat raids against the Marshall Islands in February 1942. (Photo courtesy of Stan Piet)**





SBD-5 Dauntless dive-bombers of Bombing Squadron (VB) 10 fly over the legendary "Big E," the carrier *Enterprise* (CV-6), following strikes against Palau in March 1944. VB-10 was one of the last two bombing squadrons to operate the venerable Dauntless from fleet carriers during World War II. (Photo courtesy of the National Naval Aviation Museum)

names to its aircraft, often with alliterative monikers. Thus, the Douglas Dauntless entered history.

Legend holds that the Marine Corps invented dive-bombing during the Banana Wars of the 1920s and 1930s, but the British actually pioneered the technique during World War I. The 1918 style, however, more closely represented later glide-bombing, with small bombs (often 25 lb.) released extremely low—sometimes at 50 feet.

Compared to level-bombing, dive-bombing provided vastly greater accuracy against a moving ship. As aircraft performance improved, greater loads were possible, and SBDs typically dropped 500- and 1,000-lb. bombs from about 1,500 feet in 60- to 70-degree dives. The perforated flaps (with holes 2 1/4 inches in diameter—same as a tennis ball) kept dive speed to 240 knots or about 275mph.

Meanwhile, a new generation had sprouted on the naval horizon, and the SBD was due for replacement in 1942–43. But the Curtiss SB2C Helldiver suffered a prolonged gestation, requiring the naval services to retain SBDs longer than expected.

To War

After Pearl Harbor, the U.S. Pacific Fleet played catch-up, relying almost entirely upon carriers. Between February and May 1942, a series of hit-and-run strikes kept SBD squadrons busy on USS *Enterprise*, *Yorktown*, *Lexington*, and *Saratoga*. Of these, only The Big E and "Sara" survived. Transfers from the Atlantic were *Hornet* and *Wasp*, neither of which saw 1943.

In May, U.S. code breakers learned of a Japanese plan to seize Port Moresby, Papua New Guinea, which could disrupt seaborne communications with Australia. Adm. Chester Nimitz dispatched *Lexington* and *Yorktown* to intercept the superior enemy forces, setting the stage for the most revolutionary naval battle in history.

Previously, every fleet engagement required closing to visual gunnery range. But in the Coral Sea, the entire two-day battle was fought "below the horizon" by carrier aircraft flying as many as 200 miles to reach the enemy.

On the morning of May 7, scouting Dauntlesses found the Japanese advance force escorted by the light carrier *Shoho*. Both U.S. air groups launched deckload strikes totaling 93 aircraft. They overwhelmed *Shoho*'s defenses, slamming perhaps 13 bombs and seven torpedoes into her 11,000-ton hull. Three Dauntlesses were lost, but never again would the U.S. Navy mount so large a coordinated

strike in the next three flattop duels.

Yorktown's dive-bomber skipper was Lt. Cmdr. Robert E. Dixon, who is often quoted as calling, "Scratch one flattop!" One of his aviators was Lt. Stanley Vejtasa, later famous as a fighter pilot, who recalled that the commanding officer used somewhat saltier language—hence, the more acceptable version.

The battle would continue the next day.

Both sides exchanged air strikes on the 8th, and both scored. The two big carriers *Shokaku* and *Zuikaku* lofted 69 planes against the Americans, who put up 75, both sides armed with each other's location.

Escorted by Wildcats and shooting their way past defending Zeros,*Yorktown*'s bombers nosed into their 60-degree dives over *Shokaku*. They hit her twice. "Lex's" SBDs followed, adding another hit that knocked the Pearl Harbor attacker out of commission. Contrary to the day before, no TBD torpedo planes scored hits.

The Americans lost five planes, including the SBDs of *Lexington* air group commander W. B. Ault, and *Yorktown*'s Lt. J. J. Powers. Powers had vowed "to lay one on the flight deck," and he did, but he recovered too low and went into the water. He received a posthumous Medal of Honor.

The Japanese attack swarmed both U.S. carriers, which lacked enough defending F4Fs. Therefore, SBDs were deployed on "inner air patrol" to intercept enemy torpedo planes. In a wave-top gunfight, three Dauntlesses fell to escorting Zeros. Even with tail gunners, the SBDs were at a serious disadvantage, though the Dauntless crews fought doggedly. "Swede" Vejtasa dueled with three fighters while *Lexington*'s Lt. (j.g.) W. E. Hall ignored serious wounds to remain in the fight. He received a Medal of Honor for his courageous tenacity.

Lexington succumbed to her damage, and *Yorktown* limped away with bomb hits. The world's first carrier battle was the culmination of 20 years of theory and practice by both navies, and the SBD proved itself essential to the Pacific Fleet.

The next test was close at hand.

Midway

Nimitz's code breakers again provided invaluable warning of Japan's next move. The Imperial Navy targeted Midway Atoll, 1,100 miles northwest of Pearl Harbor, forcing the Americans into a fleet engagement that might decide the war. *Yorktown* was hastily repaired and turned around in three days, embarking her previous bombing squadron with sidelined *Saratoga*'s air group in Task Force 17. The *Enterprise* and her new sister *Hornet* formed Task Force 16. The three carriers embarked six SBD squadrons, while the Marines ashore flew Dauntlesses and Vought SB2U Vindicators.

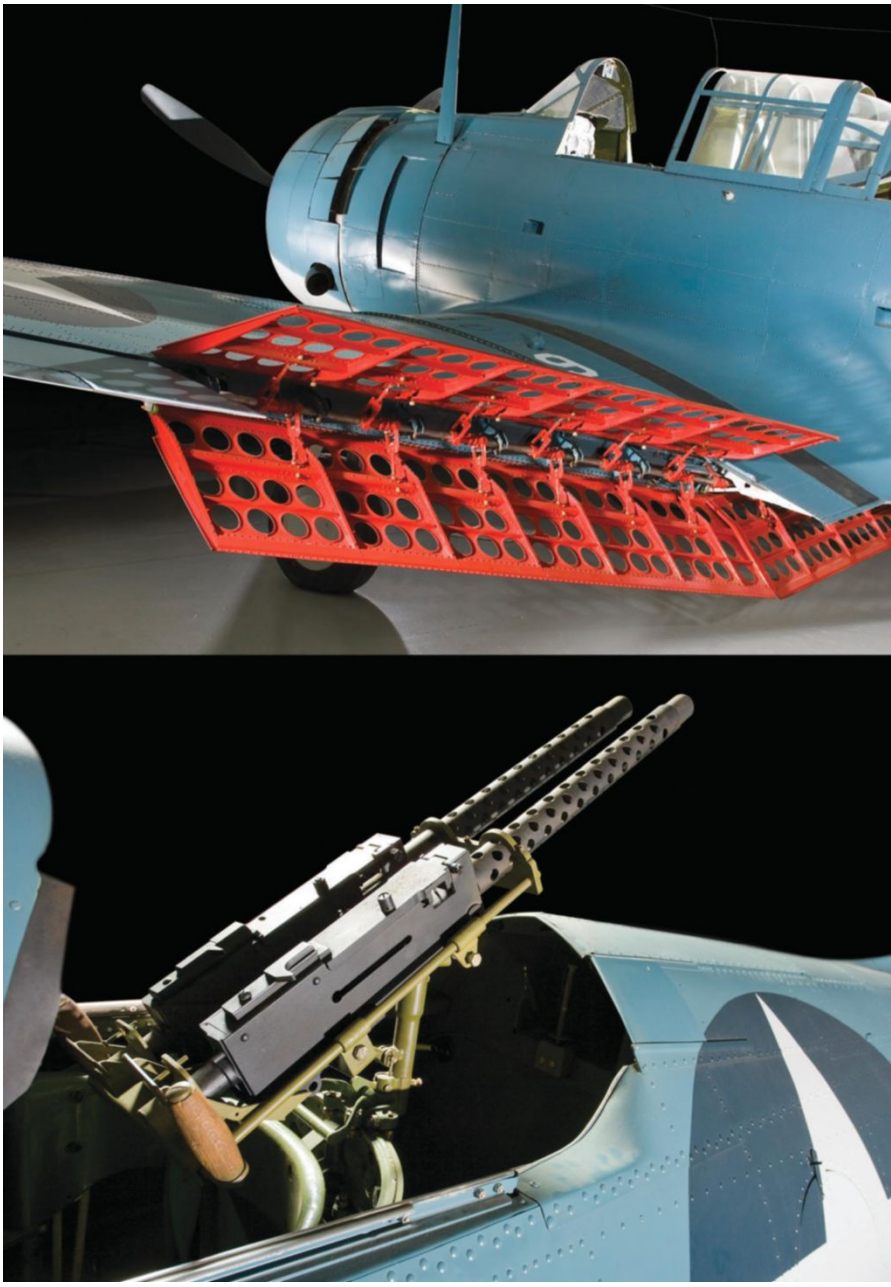
On the morning of June 4, Task Force 16 launched against the four Japanese carriers supporting the invasion force. But *Hornet*'s inexperienced air group took its SBDs out of the battle, leaving the torpedo squadron to fly into oblivion. *Enterprise*'s Lt. Cmdr. Wade McClusky navigated his two squadrons to the expected contact point and, finding nothing, played a shrewd hunch and turned north. He struck gold: 30 Dauntlesses arrived over Vice Adm. Nagumo's flight decks, while the Zeros pursued torpedo planes.

But then confusion intruded. Doctrine called for one squadron per carrier, but nearly all the Big E SBDs followed McClusky down on the 30,000-ton *Kaga*. They wrecked her with repeated hits, but that left only three planes to tackle the flagship *Akagi*.

Lt. Richard Best was the right man in the right place at the right time. He took his two wingmen

Below top: **The SBD used a combination of hydraulically activated landing and dive flaps, with the upper set deployed in a dive usually at 240mph. (Photo by Heath Moffatt)**

Below, bottom: **From the SBD-3 onward, the radioman-gunner deployed twin Browning .30-caliber machine guns, stowed in the fuselage when not needed. (Photo by Heath Moffatt)**





A pink-capped aviation ordinanceman checks the ammo feed for the dual 30-cal. gunner's position on an escort carrier in mid-1943. (Photo courtesy of Stan Piet)

in a portside attack, which concerned him. He said, "I liked to attack from the bow because it forced you to get steep." Nonetheless, he put his 1,000-pounder into the middle of the deck, while his partners scored near misses. *Akagi* turned into an inferno.

At the same time, Lt. Cmdr. Max Leslie's 17 *Yorktown* bombers arrived independently, going for the *Soryu*. Leslie had lost his bomb en route but continued at the head of Bombing Three, which destroyed the target. In minutes, the odds had been reduced from four to three against the Americans to one to three.

Hiryu, however, was a fighter. She launched two strikes that crippled *Yorktown* but could not offset the numbers. A makeshift air group left *Enterprise* that afternoon, flying with *Yorktown* orphans. They struck *Hiryu* decisively, including another hit by Dick Best. "Yorky" was finished off by a Japanese submarine, but the Pacific War had irrevocably been reversed.

The Marines also were heard from. They attacked ineffectually on the 4th, but after a day of regrouping, action resumed on the 6th. Capt. Richard Fleming of VMSB-241 fatally dived his crippled SB2U on the cruiser *Mikuma* while carrier-based Dauntlesses completed her destruction. Fleming had flown an SBD on the 4th and was the third SBD pilot to receive a Medal of Honor.

Dick Best spoke for his generation of naval aviators when he said, "Midway was revenge, sweet revenge, for Pearl Harbor." The SBD had won a strategic victory unlike any other.

Guadalcanal

Midway allowed the United States to take the offensive, and Operation Watchtower launched on August 7, 1942, at Guadalcanal in the Solomon Islands. Over the next six months, Navy and Marine SBDs were essential in winning the sanguinary campaign, flying from Henderson Field and from four carriers successively supporting the Marines ashore.

Two carrier battles were fought in Solomon waters, both necessary to keep too many Japanese reinforcements from landing. In the Eastern Solomons battle on August 24, *Enterprise* and *Saratoga*

Flying the Dauntless

In 1971, my father and two friends purchased the A-24B used by Multnomah County, Oregon, as a mosquito-control aircraft. Dad bought out his partners, and we spent almost a year restoring it to SBD-5 configuration—at the time, the only flying Dauntless.

With the gunner's flight controls installed, I could feel out the Douglas. Conventional wisdom said, "It flies like a big AT-6," which was true. Ed Heinemann's ailerons were light to the touch—a thumb and two fingers were enough at cruise speed. The SBD was exceptionally stable—what you'd expect in a dive-bomber—and one of the easiest to land of its generation.

For a better perspective on the SBD as a weapon, however, here are some comments from combat aviators.

Rear Adm. Maxwell Leslie, who led Bombing Three at Midway, considered the Dauntless "near the top of the list" of most effective combat aircraft of WW II. "The horsepower was sufficient to permit us to cruise at 165 and thus keep up with the F4Fs, which were our protective fighters. The later models had leak-proof gasoline tanks, which probably saved the life of more than one pilot. Both the pilot and gunner had bullet-proof back protection."

Retired Capt. James "Moe" Vose commanded the first SB2C squadron in combat but flew SBDs with VB-8 on *Hornet.* He recalled, "In March 1942, we left Norfolk for San Diego, where we turned in our SBC-4s for SBD-2s and -3s. Then to San Francisco to pick up the Doolittle raiders in April. The B-25s being launched, several of the more experienced pilots were sent on a search. I and one other pilot were the only ones who had landed an SBD on a carrier. All but one plane got aboard, which is some kind of record when the weather and degree of training are considered.

"The SB2C was of little improvement on the SBD. It could carry a 1,600-lb. bomb or two 500s in the bomb bay. But the SBD would be my choice as an honest airplane."

Marines also were fond of the Dauntless. Gen. Richard C. Mangrum led the first SBD squadron at Guadalcanal. With a bare minimum of support personnel and equipment, VMSB-232 "just flew 'em as they were. The ruggedness of the SBD kept us in business. The Dauntless never let us down."

Mangrum's operations officer (later Col.) Bruce Prosser, added, "The particular dive flap arrangement made the SBD one of the most stable ordnance delivery platforms that I ever used. Its delivery speed could be adjusted to the pilot's advantage. I used to like to push over and then pop those flaps in the dive."

Though eventually replaced by the Helldiver in service, the Dauntless was seldom replaced in its pilots' hearts.



The business end of an SBD-5 showing the pilot's two .50-caliber machine guns firing through the propeller arc. (Photo by John Dibbs/ planepicture.com)



MAJOR WARSHIPS SUNK BY DAUNTLESSES

Shoho	Japanese light carrier*	May 7, 1942
Akagi	Japanese fleet carrier	June 4, 1942
Kaga	Japanese fleet carrier	June 4, 1942
Soryu	Japanese fleet carrier	June 4, 1942
Hiryu	Japanese fleet carrier	June 4, 1942
Mikuma	Japanese heavy cruiser	June 6, 1942
Ryujo	Japanese light carrier*	Aug. 24, 1942
Jean Bart	Vichy French battleship+	Nov. 8, 1942^
Kinugasa	Japanese heavy cruiser*	Nov. 13, 1942
Hiei	Japanese battleship+	Nov. 14, 1942

***** *Shared with torpedo planes*
+ *Shared with surface ships and/or aircraft*
^ *Sunk in port, repaired*

SBD-3 #106 orbits Henderson Field on Guadalcanal while awaiting the other aircraft in its strike mission to take off and form up for a mission during early 1943. The Dauntless is armed with a single 1,000-lb. general-purpose bomb on its centerline rack. (Photo courtesy of Jack Cook)

Dauntlesses fought a rematch with *Shokaku* and *Zuikaku* augmented by light carrier *Ryujo*. SBDs again figured prominently, being mainly responsible for putting *Ryujo* on the bottom. Nagumo's expertly flown Aichi Vals, however, badly damaged the Big E before the action ended.

Two months later came the climactic Battle of Santa Cruz, fought north of Guadalcanal. *Wasp* had been sunk by a submarine in September, and "Sara" was damaged, leaving *Enterprise* and *Hornet* alone. Despite fighting four enemy carriers, the Americans got an early edge thanks to *Enterprise*'s scouts. Lt. S. B. Strong and Ensign C. B. Irvine heard a contact report and left their assigned sector to stalk the flattops. They got a shot at *Zuiho*, hitting her twice and eliminating her from the battle. They scraped back on fumes after flying as perfect a mission as ever launched from carriers.

Hornet's SBDs struck *Shokaku*, but the Japanese were resilient and persistent. They hit both U.S. carriers hard, sinking *Hornet* and again mauling the Big E. But the situation ashore remained unchanged, if tenuous.

From there on, the Americans increasingly had their way. Land-based SBDs continually reduced Japanese naval power, ultimately forcing Tokyo to withdraw from "Starvation Island." Navy Secretary Frank Knox said that Grumman saved Guadalcanal, but Douglas was every bit as much a savior.

Other Battles

The SBD fought a global war beyond the Pacific. In November 1942, while the crisis peaked at Guadalcanal, Dauntlesses supported the first Allied offensive against the Western Axis. Operation Torch, the Anglo-American landings in French Morocco, involved SBDs aboard USS *Ranger* and three escort carriers. *Ranger*'s Dauntlesses contributed to sinking the Vichy French battleship *Jean Bart* in Casablanca harbor, though she was refloated and repaired.

Eleven months later, *Ranger* steamed far north, launching strikes against Axis shipping off Norway. Operation Leader sank four merchant vessels and badly damaged two larger ships.

As more squadrons arrived in the South Pacific in 1943, SBDs moved up the Solomons chain with other Allied aircraft. The lengthy aerial siege of Rabaul, New Britain, added hundreds of sorties to the Dauntless's combat log.

As did the long, unheralded Central Pacific

campaign. The Fourth Marine Aircraft Wing perfected dive-bombing against bypassed Japanese islands, continuing the action until V-J Day. And another little-known contribution occurred in the Philippines when Marine SBDs directly supported Army forces, even guarding the First Cavalry Division's flank during its drive on Manila.

Although the Dauntless remained in production until July 1944 and served ashore until V-J Day, it was increasingly replaced after 1943 by the belated Helldiver. Total SBD and A-24 production was 5,936 aircraft from El Segundo and Tulsa, Oklahoma.

The SBD's last carrier appearance came in the Battle of the Philippine Sea in June 1944. Two years after Midway, the SB2C had largely replaced Dauntlesses aboard ship, but *Enterprise* and the new *Lexington* (CV-16) still flew SBD-5s on the "mission beyond darkness." On the evening of June 20, they struck Japanese carriers fleeing the "Marianas Turkey Shoot" and sustained far fewer losses than the Helldivers.

Despite missing the first 11 months of the war, the SB2C made up the deficit by serving in far more carrier squadrons than its predecessor. Carrier-based SBDs logged 5,850 "action sorties" throughout the war, only one-third of the Helldiver's 18,800 in 1943–45, while delivering just one-fifth the ordnance. Flying from flattops, the two dive-bombers recorded nearly identical loss rates in combat and overall operations.

Aéronavale Dauntlesses remained in service well after V-E Day, operating from the former British-built carrier *Arromanches*. In a chilling preview of Douglas A-1s, A-3s, and A-4s, *Arromanches*' SBDs launched and "trapped" in Tonkin Gulf waters from 1947 to 1949, though some were retained as operational trainers until 1953 or beyond.

Other postwar noncombat use of SBDs and A-24s included Mexico, Chile, and, in an obscure role, the Moroccan Desert Police.

Today, perhaps two dozen examples remain intact with four SBDs and three A-24s currently registered as airworthy.



A "clean" Dauntless without ordnance could push 250mph. The holes in the landing and dive flaps were the same diameter as a tennis ball! (Photo by John Dibbs/planepicture.com)

Other Users

Because the U.S. Army Air Forces (AAF) lacked a suitable dive-bomber, Douglas's Tulsa factory began producing A-24 Banshees in 1941. AAF squadrons flew their bombers in the Philippines and Java, suffering heavy attrition, but they eventually recovered to use Banshees in New Guinea, the Central Pacific, and even Alaska. Including those transferred from the Navy, the AAF acquired some 950 Douglases, which largely left service in 1944.

In the Pacific, the only other operator was the Royal New Zealand Air Force (RNZAF), which obtained former Marine Corps SBDs in 1943. Flying in the Solomon Islands, the Kiwis of No. 25 Squadron RNZAF flew Dauntlesses until receiving F4U Corsairs in 1944.

Around the globe, France was a good Douglas customer, with orders for A-20s and SBDs. The European war, however, prevented their delivery, and eventually the Free French air force and navy received initial batches of SBD-3s in North Africa in 1943. French aircrews subsequently flew against Germany in Europe, though the *Wehrmacht*'s light flak took a toll of the SBD's light airframe.

Debrief

In chronological order, the three most important aircraft of the Pacific War were the SBD, which won the essential victories of 1942; the F6F Hellcat, which destroyed Japanese airpower; and the B-29 Superfortress, which scourged the home islands, forcing nuclear capitulation. Lest anyone doubt the SBD's primacy, consider American fortunes absent the Dauntless: Vought SB2U Vindicators at Coral Sea, Midway, and Guadalcanal. Even had the Helldiver been committed prematurely, its likely performance in 1942 remains a chilling prospect.

Tale's End

Like Arthur's sword, which returned to the Lady of the Lake, many an SBD found a watery resting place for eternity. And how sadly appropriate that the Dauntless was fated to share Excalibur's fate. Perhaps obeying some long-forgotten oracle, the Dauntless was taken up by men who heeded the ancient command, "Take thou and strike!"

And then, as if someone had turned the blade over and read the second command, she was cast away. ✠



Bristling with an assortment of machine guns and rockets, the Seawolf UH–1B Hueys were always overloaded when they lifted off for a mission. (Photo by Jim Koepnick/EAA)

Riders ON THE Storm

ATTACK OF THE NAVY'S LITTLE-KNOWN SEAWOLVES

BY **LT. CMDR. BUD BARNES, USN, RETIRED** AS TOLD TO AND WRITTEN BY **JAMES P. BUSHA**

"Riders on the storm. Riders on the storm. Into this house we're born. Into this world we're thrown."
–The Doors, 1971

Seawolf Formation

In 1967, the U.S. Navy established Helicopter Attack (Light) Squadron Three, commonly known as HA(L)-3, unclassified call sign: "Seawolf." The in-country formation and disestablishment in 1972 was a historic first.

The Navy stood up three "brown-water" task forces to combat communist infiltration along the coast and interior waterways.

Operation Market Time operated "Swift Boats" patrolling along the coast and initially the large rivers. Operation Game Warden operated "patrol boats, river" (PBRs) on the canals and smaller rivers, while the Mobile Riverine Force supported the Army's 29th Division, which had its own integral air support (helicopters) and forward air controllers for Tac Air. Game Warden was supported on a catch-as-catch-can basis by individual U.S. Army aviation units until they finally cried "uncle!," relating they had more than they could handle supporting their own units, let alone covering the Navy's growing needs. That situation spurred the call for integral support of Game Warden—hence, the birth of the Seawolves.

HA(L)-3 initially consisted of nine detachments, each with two helicopter gunships and two four-man crews per Huey, stationed in various locations throughout the Mekong Delta. They were based aboard barracks ships positioned in the large rivers and on offshore LSTs (landing ships, tank).

The Army ended up loaning the Navy 30 to 35 "war-weary"



When the Seawolves were formed, the U.S. Navy had to go to the Army and "borrow" nearly three dozen Hueys, all of which were war-weary machines that Navy crews worked hard, day after day. (Photo courtesy of the National Naval Aviation Museum)

UH-1Bs. After the Navy repainted and rearmed the Hueys, the Seawolves proceeded to carve a name for themselves in the history books. I was just a small part of it when I arrived in 1969.



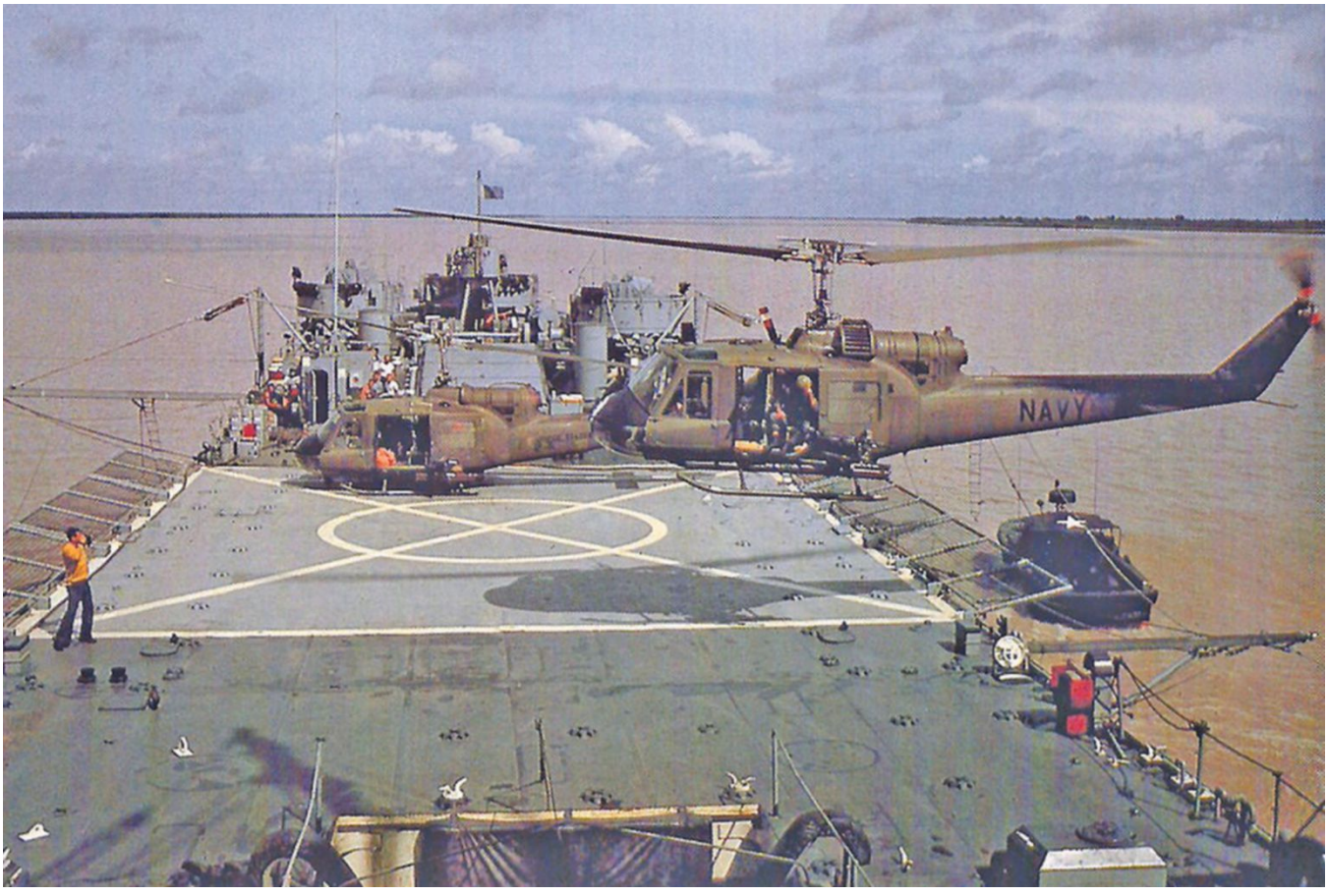
Right: Bud Barnes (left), with his orange Mae West life jacket, and Elden Fry (right), who was assigned to the PBRs, pose during Operation Sling Shot. (Photo courtesy of Bud Barnes)

Learning the Ropes

By the time I finished training in 1968, most of my flight time, including my carrier qualification, was in fixed-wing aircraft, like the North American T-28 Trojan. For me, Navy advanced flight training (helicopter pipeline) consisted of 20 hours in the TH-13, then another 50 in the H-34 Choctaw. I received orders to report to "Mother Rucker" (the Army's Fort Rucker, Alabama) for a qualifications course in the Bell Huey. I had never seen a turbine helicopter until laying eyes on the Huey in January 1969.

One of the great things about the Huey was that I didn't have to manipulate manifold pressure nor rpm as it was done automatically. The UH-1B was powered by a Lycoming T53-L-5 turboshaft developing 960shp (shaft horsepower). The twin main rotor blades spanned 44 feet with a 21-inch cord. The cabin could accommodate seven passengers or an assortment of weapons systems. The "Q" course provided a limited exposure to the various weapons systems that were constantly updated in-country.

I became a real believer in what the Huey could do during one of my first training hops. At the end of the flight, we were pretty light on fuel, and it was cool in January upon returning to



Below: The Seawolf Hueys operated off of small "carriers" converted from transports within a short flying distance of shore. (Photo from I-net)



The right-door gunner zeros in on his target with his .50-caliber machine gun. (Photo by Jim Koepnick/EAA)

base. The instructor put the Huey into a hover, chopped the throttle, set it down, picked it back up, and turned 360 degrees. I was horrified, given my limited H-34 (fully articulated rotor head) background. All I thought was, "We're going to die!" Now, I could appreciate all the inertia in the Huey blade system. To say that I was impressed was an understatement. I had a very experienced Army warrant-officer instructor who had just returned from a tour in Vietnam, and he was showing me how to stay alive. The syllabus consisted of 25 hours with a couple of night hops that included performing a dozen "full" auto rotations on little partially paved strips with smudge pots lining the edge of the runway for light. I had never done a night full auto before.

We also did one contact navigation landing in a confined LZ (landing zone). About half of the transition-qualification course was ordnance training: 2.75-inch Mighty Mouse rocket firing from the right seat and machine-gun runs from the left seat. I had to wait until flying with a gun team to experience the "full-meal deal," with gunners opening up in the back—that got my attention! After throwing some holy water on me, coupled with a three-week orientation in San Diego, California, including survival, evasion, resistance, and escape, I was off to Vietnam.

In Country

As fresh "nuggets" (first-tour pilots) right out of flight school, six of us arrived the same week in early March 1969. We received three days of orientation, including an ops briefing by a "seasoned" nugget who had arrived three months earlier. His words of wisdom are remembered to this day: "I will tell you what was told me when I arrived. Look around the room, as 50 percent of you will have a catastrophic emergency in the next year." The six of us were sent on to our various detachments. Two of the six were lost within two months. I was lucky: I only had two catastrophic emergencies during my tour.

I was initially assigned to Detachment 1 in the lower Ca Mau Peninsula. We were operating off

SEAWOLF 324 SPECIFICATIONS

Army Serial Number: 63-12923
Navy Modex Number: 324
Turbine engine: Lycoming T53-L-13A, 1400hp
Rotor diameter: 44 feet
Fuel capacity: 168 gallons
Empty weight: 4,900 lb.
Gross weight: 8,500 lb.
Max airspeed: 120 knots
Armament (inert, replicas)

- M2HB .50-caliber right-door guns
- Dual M60 7.62mm left-door guns
- M134 "Mini Gun" 7.62mm
- Dual M158 7 shot, 2.75 rocket pods
- M79 40mm "Chunker"
- M16A1 crew weapons
- M1911 .45-caliber crew pistols
- Smoke grenades
- 10,000 rounds of ammo

HUEY FACT The prototype UH-1 Huey first flew in 1956, and while production officially ended in 1987, the basic machine lives on in the current production UH-1Y. The Huey was the first helicopter that employed a turboshaft engine. The Lycoming T53 was installed above the fuselage and close to the main rotor unit, just behind the gearbox unit. This allowed for a much larger cargo hold and the capability to transport a greater load.



Above: The left side of the Huey was manned by a door gunner who operated dual M-60 7.62 machine guns, while the front-seat pilot operated the M134 7.62 "Mini Gun" and dual 7-shot 2.75-inch rocket pods. (Photo by Dennis Bergstrom/EAA)
Below, left: Death's door: The sighting mechanism used by the left-seat pilot to fire rockets and Mini Gun. (Photo by Tyson Rininger/EAA)
Below, right: From "top hat" to trigger, the stick grip of the Huey had an assortment of buttons and switches. (Photo by Tyson Rininger/EAA)





HUEY FACT **The UH-1 holds the world record for flying the most combat hours of any aircraft in history. Some 17,000 Hueys flew 26,733,403 sorties alone during the Vietnam War. More than 21,166 hits by enemy fire were recorded with 4,128 Hueys lost in combat.**

the large LSTs supporting PCF (patrol craft fast) Swift Boats, which had been operating since November 1968 on the smaller rivers of the Nam Can forest area. Our LST was anchored just outside of rocket range from the shore. Flying a heavily loaded (actually, overloaded) Huey off a steel deck in hot, humid weather required coaxing the bird into a hover. With skids free, engine topped out in a 2-foot hover, the trick was to back up with your tail hanging over one side as you began your thwart-ship's deck run, a "full" 50 to 60 feet. When you got to the opposite deck edge, the Huey basically fell off, pointed downward toward the water 20 feet below. Then you had to pull out, staying in "deep ground effect" 3 feet above the water, praying that in a couple of seconds you would acquire transitional lift, taking a deep breath, and continuing to hold altitude until acquiring the magical 82 knots (lift over drag max) to achieve the best climb rate.

Have Guns Will Travel

We worked primarily in concert with the Swift Boats, which had done a fabulous job earlier dealing with offshore infiltration, essentially shutting it down. The PCFs now began patrolling areas that weren't previously covered in the lower Nam Can. The boats were not really made for the small rivers because they had too high a profile, but at least they were heavily armed. The Swifts that we worked with would go to certain little villages supported by regional/providential Vietnamese troops (similar to our National Guard), embarking them with an advisor. Sometimes Cambodian mercenaries with Special Forces advisors would embark. Our job was to support their operations. When they came under fire, we scrambled within three minutes of a call. We were primarily a reaction force, so when we got the call, day or night, sunshine or monsoon rain, we flew to the fight.

Most of the missions were only between five and 15 miles away. The real bugaboo was that there wasn't a lot of training for those missions—it was all on-the-job learning. We typically flew 75 to 100 hours a month, 24 hours on call and 24 hours off. Many times, we flew three times a day. You would put in a strike, hustling back to the LST for a "hot turn" (no shutdown), taking on fuel while the gunners rearmed as they swept out hundreds of expended 7.62 rounds. A fresh set of M60 boxes, made up by off-duty gunners, were shoved aboard. Each gunner had over 1,500 rounds of 7.62, and the flex guns had



Like a ghost from the past, this Seawolf combat–veteran Huey was restored and preserved so that the memories of those who paid the ultimate sacrifice would never be forgotten. (Photo by Phil High/EAA)

History of Seawolf 324

Bell UH-1B Huey, serial number 63-12923, was built in 1963 and delivered to the U.S. Army in October 1964. By 1965, it was in Vietnam and experienced its baptism of fire on April 8, when it took three hits to one of its skids. Two weeks later, it was brought down by small-arms fire and incurred major damage. It was sent back to the States for repair and returned to Vietnam in March 1967. Serving with the 1st Cavalry Division in A Troop, 1st Squadron, 9th Air Cavalry, it was again damaged in February 1968. The Army said good-bye to the battle-weary Huey in November, "loaning" it to the U.S. Navy where it began flying with the Seawolves.

This particular Huey was more like a "flak magnet" because it was heavily damaged again in October 1969 and didn't return to the Seawolves until November 1970. Its total hours at that time were 3,198, when it was assigned to Seawolf Detachment 9 and given the modex number 324. On May 28, 1971, it was hit again, this time by a 75mm recoilless rifle. It was determined that the damage was "minor" as the crew performed an emergency medevac and flew an injured sailor to a nearby surgical hospital.

The last military flight of 324 occurred on February 29, 1972, when HA(L)-3 returned the Huey back to the Army, where it was crated and shipped back to the United States. In October 1973, it was loaned to the National Aeronautics and Space Administration's Langley Research Center until August 1975.

Huey 12923, with hundreds of others, was placed in long-term storage at Davis-Monthan Air Force Base in Tucson, Arizona, with a total of 4,390 flight hours. It would languish in the hot desert sun for the next 16 years before being rescued once again.



A UH-1E Huey gunship of HAL-3 Seawolves flies cover over a group of U.S. Navy PBRs over the Mekong River Delta in South Vietnam during 1968. (Photo courtesy of Jack Cook)

MEDALS FOR THE SEAWOLF

In its time, HA(L)-3 probably was the most decorated squadron in the U.S. Navy, with 44 Seawolves killed during the five years of combat. During the Vietnam War, the men of HA(L)-3 were awarded the following:

Navy Crosses	5
Silver Stars	31
Legion of Merit awards	2
Navy and Marine Corps Medals	5
Distinguished Flying Crosses	219
Purple Hearts	156
Bronze Stars	101
Gallantry Crosses	142
Air Medals	16,000+
Navy Commendation Medals	439
Navy Achievement Medals	228
Presidential Unit Citations	6
Meritorious Unit Commendations	2
Vietnam Meritorious Unit Commendation	1

roughly 1,000 rounds each. Our lead bird was equipped with a .50-caliber gun in the right door. The left door gunner had two, freely held M60s with a total of three barrels. After a lengthy firing, the gunners had to remove a "red-hot" barrel to avoid "cooking off" a round. The barrels would get so hot that the gunners could light their cigarettes. The 2.75-inch Mighty Mouse rockets had their own set of issues.

We flew as a pair in a gun team, 500 feet apart, with the lead ship at 1,000 feet and the trail ship at 1,200 feet. With fighter aircraft, you stack down, but in helicopters, you stack up (i.e., the trail ship has to maintain rotor clearance). The principal tactic for delivery was to get a mark on the ground, or if you were patrolling, upon receiving fire, the gunner would throw out a smoke grenade for a marker. We had a pole that clipped in between the cabin deck and overhead on each side. A soda can with the top removed was duct-taped to the pole and a smoke grenade inserted, pin pulled, with the spoon held in place by the can. All the gunner had to do was to throw it out. The lead aircraft would normally be "first in," but if the trail had a better fix, then the lead would come in behind. The first rocket fired would usually be a "Willie Pete" (high-explosive white phosphorus) to better mark the target. The next firing run would typically be pairs of high explosives. Shooting a rocket from a helicopter is a very imprecise science. Rockets seek the relative wind, and consequently, keeping your aircraft in trim with minimal power correction is paramount to a good delivery. By far, the more precise weapons system was the Mark I Mod 0 gunner.

If the troops on the ground or one of the boats popped a smoke, they

The front office of the UH-1B Seawolf Huey. (Photo by Dennis Bergstrom/EAA)



HUEY FACT During the peak of the Vietnam War (1970–1972), the U.S. Army was training more than 3,000 pilots and 21,000 mechanics per year to keep the helicopters flying.

would not tell us the color until we called it, thus avoiding a possible VC (Viet Cong) trap. Once communications were established, the fire team leader would determine the attack plan. As the first aircraft rolled in the door, gunners would fire forward and, in the break, would transition to firing aft as the trail ship commenced firing. That was an attack pattern called a "daisy chain." The whole idea was to keep constant fire on the target.

But it wasn't only enemy fire that we had to worry about, especially in the dry seasons when the water level went down. As the Swift Boats engaged their .50 calibers, sometimes ricocheting rounds could rise above our attack pattern. At night, I've seen tracer ricochets burn out at more than 1,500 feet. We had to communicate with each other all the time, but in the heat of combat, things can go south in a hurry.

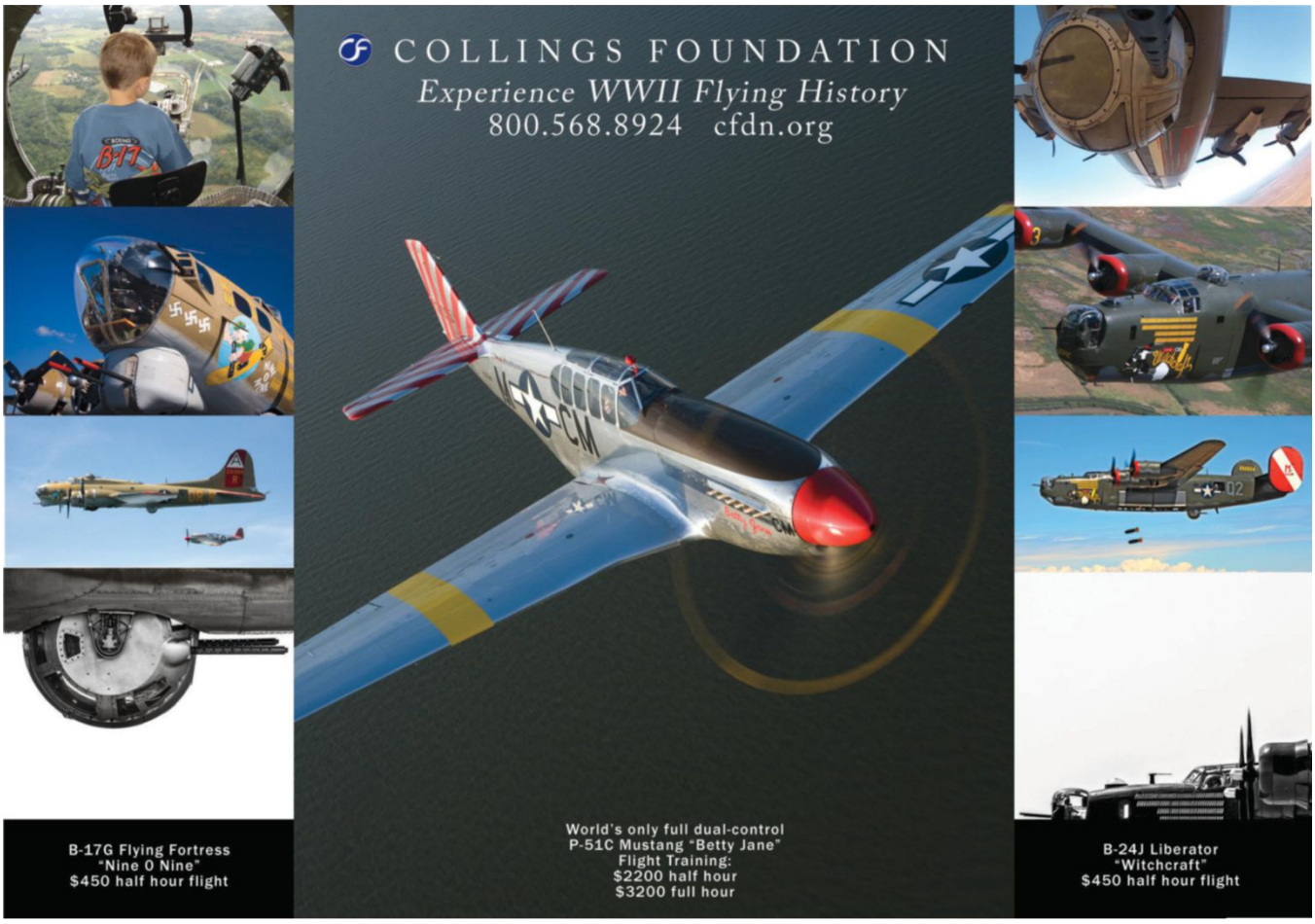
I recall one mission in May or June of 1969 when, around midnight, we got scrambled from the LST on the South China Sea side of the Nam Can. The SEAL boat had gone on an operation and made a fatal mistake of crossing the same point three times. On the third crossing, they really got hosed, disabling their boat. They were outnumbered and outgunned, so we were scrambled. I could see the firefight up ahead and was able to determine where the SEAL rounds were going on the riverbank, setting up a good angle for our fire. Gunner Keith Jasman was in the right door and placed exceptionally accurate fire, expending everything he had on just one pass, completely stopping enemy fire. We had launched into a clear moonlit night. Returning to the ship, we were just ahead of an incoming monsoon wave. The rotor blades had barely come to a stop when we went zero-zero in heavy rain. With mangrove swamps and 80-foot-high trees, there was no location to have landed ashore.

Had we landed 15 minutes later, I probably wouldn't be relating this story. That was pretty much the mentality in those times: "You just have to do what you have to do." But on the other hand, there was license (a good set of rules of engagement) so that we could get it done!

Bud Barnes hails from Arkansas and is the son of a World War II Navy veteran. Bud flew 700 missions in Vietnam. He is retired from the U.S. Navy and from American Airlines, having flown more than 20 types of military aircraft and six commercial jets on four continents. He currently serves as president of the Seawolf Association.

HUEY FACT

The UH-1B Seawolf Huey was flown by the pilot (right seat) and copilot (left seat) with more than 140 cubic feet of passenger room behind them. Depending on the mission, the rear sliding doors on either side could be removed to accommodate two door gunners, eight fully armed SEALs, or three stretchers.



EVALUATING RUSSIAN AIRPOWER

A REVITALIZED FIGHTING FORCE NOT YET READY FOR PRIME TIME

BY **TOM COOPER**



About 70 legacy Su-27Ps (foreground) and Su-27UBs (background) and 65 Su-27SM/SM-3s represent the backbone of the VKS's fighter-interceptor fleet. (Photo by Chris Allan/Check Six)



Many of us grew up during the Cold War, when a possible confrontation between the United States and its allies in the North Atlantic Treaty Organization (NATO) versus the Warsaw Pact forces, dominated by the former Soviet Union (USSR), was dictating the thought patterns of Western military forces and intelligence services. Studying Soviet–and Allied–military power was daily bread for many Western military analysts. But the Soviet Union fell apart in the early 1990s, and most of its former allies in Eastern Europe joined the European Union. Indeed, for 30 years the direct successor to the USSR–the Russian Federation–was an important trade partner and then an ally, of sorts, in regards to specific security issues. Regrettably, the foreign politics of Russian President Vladimir Putin have spoiled good relations in the last few years, and studying the Russian military capabilities is once again an important discipline.

Given that the United States and NATO again find themselves possibly facing their old nemesis, this time in Syria, the following review was written to provide an insight and summary about tactical combat aircraft of what is now the Russian Aerospace Force (*Vozdushno-Kosmicheskie Sily Rossii,* or VKS).



THE COLD FACT IS THAT THE MAJORITY OF THE RUSSIAN TACTICAL FIGHTER FLEET CONSISTS OF OBSOLETE DESIGNS, WHICH AVERAGE BETWEEN 26 AND 30 YEARS OLD.

Because of the sheer size of the airspace that it has to protect, the VKS remains heavily dependent upon a fleet of about 130 MiG-31 interceptors. (Photo by Katsuhiko Tokunaga/ Check Six)

An Air Force with More Recent Downs than Ups

Not much was happening with the Russian air force for most of the 1990s and early 2000s. Preoccupied with necessary political and economic reforms, and lacking funding, Moscow was much too busy to properly finance its armed forces. Many VKS pilots were happy if they could get their hands on an operational aircraft and then clock between 20 and 50 hours of training annually. Serious tactical exercises and evaluations were run only by a few instruction-research units and almost exclusively in cooperation with, and on behalf of, foreign customers.

Worse yet, not only the VKS but also the entire Russian aircraft-manufacturing sector had been badly weakened by the Adolf Tolkachev espionage affair in the early 1980s. Tolkachev revealed to the CIA the secrets of an entire generation of new combat aircraft and armament about to enter Soviet service. The Russian aerospace sector hadn't recovered from that blow before suffering the next: Through much of the 1990s, thousands of highly skilled designers and engineers emigrated to the West. What was left of local aircraft manufacturers was surviving by selling available aircraft and armament to export customers; many companies were limited to doing little more than advertising various paper projects or announcing new variants of already existing equipment, most of which never saw the light of day (except for computer simulations).

The situation began to change gradually in 2009, when Moscow launched a major reform of the VKS and of its aerospace industry. True to form, much of the reform either never materialized or was reversed in August 2015. However, a number of orders for new equipment placed in the meantime are in the process of changing the look of the Russian Aerospace Force. Even more important, a massive increase in the supply of fuel and spares, combined with a large-scale over-



haul of available aircraft, has resulted in significant revitalization of the service.

Appearances versus Realities: Their Force Soldiers On

When discussing the present condition of the VKS, it is important to stress that the actual situation remains entirely different from that usually presented to the public. Despite an image of a force equipped with some of the world's most advanced interceptors and fighter-bombers, the cold fact is that the majority of the Russian tactical fighter fleet consists of obsolete designs, which average between 26 and 30 years old. Replacements in the form of a fifth-generation fighter is not really in sight: Sukhoi's ambitious PAK-FA program for a heavyweight stealth fighter—the prototype of which first flew in 2010—continues to suffer from development problems and ever more massive delays. The same can be said for many often-adored advanced variants of existing types. Similarly, many of the air-to-air and air-to-surface missiles with which the Russian media and even manufacturers frequently boast about in public either have never entered production or were never purchased by the VKS; they were sold only to export customers.



A pair of R-33s (AA-9 Amos), currently the longest-ranged air-to-air missiles in worldwide service. (Photo by Piotr Butowski)

At the forefront of the VKS's tactical component are about 130 MiG-31 Foxhounds, 65 of which were gradually service-life-extended and -upgraded to MiG-31BM/BSM standard under three contracts in 2007, 2011, and 2014. Equipping a total of nine 12-aircraft frontline squadrons and one instructor-research unit, they are likely to remain in service until at least 2020, or even longer, because, due to tensions with the West, the VKS is assigning increased priority to the type. Indeed, the entire fleet is presently planned to receive a large-scale avionics upgrade, combined with an overhaul of airframes and engines.

Whether the planned update might include new weapons is presently unclear. While MiG-31BM/BSMs are compatible with the often-idolized R-77/RVV-AE (AA-12 Adder) active-radar-homing, medium-range, air-to-air missile (MRAAM), there are no such weapons in VKS service. Namely, the original variant—R-77—not only proved prohibitively expensive but also, in service abroad, became rather notorious for suffering from poor quality. Furthermore, while various new designs or further developments of the R-73 infrared-homing (IR-homing), short-range, air-to-air missile (SRAAM) have been announced, none has entered service. Correspondingly, all of VKS's Foxhounds are still exclusively armed with R-33 (AA-9 Amos) and R-37M (AA-13 Arrow, which can be carried by MiG-31BMs only) long-range, air-to-air missiles (LRAAM) and R-73 SRAAMs.

That said, since the retirement of Grumman's

The most modern development of the Su-27 family, the Su-35 is intended as a low-cost alternative to the fifth-generation stealth fighter already in service in the United States or about to enter service in China and elsewhere. (Photo by Katsuhiko Tokunaga/ Check Six)

THE SU-35S IS THE ULTIMATE SINGLE-SEAT, MULTIROLE DERIVATIVE OF THE ORIGINAL SU-27, DESIGNED TO MATCH 4.5-GENERATION WESTERN FIGHTERS SUCH AS THE EF-2000 TYPHOON AND FRENCH-MADE DASSAULT RAFALE.

F-14 Tomcat in 2006 and pending the IOC (initial operating capability) of such Western MRAAM-like Meteors, Russia's semiactive-radar-homing R-33 and active-radar-homing R-37M are the longest-range AAMs in worldwide service. They pack a powerful punch in the form of a 60kg (135-lb.) heavy warhead, and the Arrow is custom-tailored to target AWACS (airborne warning and control system) and other command-and-control aircraft.

The core force of the VKS consists of Sukhoi Su-27/30/35 (Flanker) single- and two-seat fighters and fighter-bombers, which currently equip 14 frontline and one instructor-research squadron. Between them are 53 upgraded Su-27SMs, dating from 2003–09; 12 newly built Su-27SM-3s, acquired in 2011; 70 legacy Su-27P/UBs, acquired in the 1980s; a few brand-new Su-35Ss; and four newly built Su-30M2 two-seaters with dual controls and full combat capability. This fleet is to be reinforced through the addition of 48 Su-35Ss, ordered in 2009 (14 are currently undergoing testing); 60 newly built Su-30SMs, ordered in 2012 (about 20 being delivered by now); and an upgrade of 36 existing Su-27Ps to Su-27SM-3 standard, announced in 2015.

The Su-35S is the ultimate single-seat, multirole derivative of the original Su-27, designed to match 4.5-generation Western fighters such as the EF-2000 Typhoon and French-made Dassault Rafale. The Su-35 will feature thrust-vectoring engines and refined aerodynamics in addition to "Russian-only" mission avionics and armament suite. Its introduction is proceeding rather slowly, however, because of a number of shortcomings revealed during flight testing. Therefore, the most advanced of the aircraft currently in service with the VKS are Su-30SM multirole fighter-bombers. This is a derivative of the Su-30MKI/MKM exported to Algeria, China, India, Malaysia, and Venezuela, and roughly comparable to the F-15E in capabilities. Indeed, even as delivered to the VKS, the Su-30SMs are still equipped with a French holographic HUD and a Russian avionics suite featuring Indian- and Israeli-made systems. Introduction of a "Russian-only" avionics suite is, therefore, a "must" for the VKS.

As indicated above, all the VKS's Flankers are still armed exclusively with old R-27 semiactive-radar-homing MRAAMs and R-73 SRAAMs—the same weapons that represent primary armament of the MiG-29 ("Fulcrum"), which is roughly comparable to Lockheed Martin F-16 Fighting Falcon in flying performance (although hopelessly outclassed in terms of avionics and armament).

Talking about Russian Fulcrums, contrary to the bright future of Su-27-derivatives, the fate of MiG-29s still serving with the VKS appears to be sealed. While representing the quantitative backbone of the service, availability rates and overall numbers of this type are diminishing—primarily because Moscow abandoned proceeding with the midlife upgrade to MiG-29SMT standard. The decision about the order for 30 MiG-35s, announced in 2013, has been repeatedly postponed, and the "newest" examples still in service are 28 MiG-29SMTs and 6 MiG-29UBTs originally built through installation of new avionics into airframes assembled in late 1980s. They were destined for but turned down by Algeria in 2009. Poor quality of mission avionics, short operational range, and severe fin cracks found on the majority of legacy MiG-29s make them nearly unimportant in the sense of real-world operational value, and they are all likely to be withdrawn from service by 2020.



Based on widely exported Su-30MKI/MKM, the Su-30SM is the major future multirole fighter of the VKS. (Photo by Richard Seaman/Check Six)

The backbone of the VKS's fighter-bomber fleet remains the venerable Sukhoi Su-24M, operated by six squadrons; it is roughly comparable to General Dynamics' F-111, withdrawn from U.S. Air Force (USAF) service nearly a decade ago, in terms of flying and carrying performance. Two squadrons fly upgraded Su-24M2s, while three have recently upgraded to Su-24M-SVP-24s. The former is of moderate quality yet much more expensive, while the latter is little known but much more affordable with the improvement of the type's nav/attack platform. Both primarily address the old and well-known issues related to low accuracy of the navigational platform, long needed for mission planning and data input, and limitations



More than 200 MiG-29s remain in service with the VKS, but that type's future seems to be sealed by repeated postponement of the decision regarding the pending upgrade to SMT standard. (Photo by Katsuhiko Tokunaga/Check Six)

THE SU-24 FENCER WAS ALWAYS A HANDFUL TO FLY AND MAINTAIN, AND IT WAS THE TYPE WITH THE WORST FLIGHT SAFETY RECORD IN VKS's SERVICE.



Twelve squadrons of the VKS are still equipped with Su-24Ms, Su-24M2s, Su-24M-SVP-24s, and Su-24MRs, the fleet of which is reaching de facto block obsolescence despite upgrades. (Photo by Piotr Butowski)

of weapons deployment from straight-line flight only, and primarily address the more accurate delivery of low-cost, unguided bombs.

The Su-24 Fencer was always a handful to fly and maintain, and it was the type with the worst flight safety record in VKS's service. Therefore, Russian tactical aviation presumably experienced a huge boost in its combat capabilities when Moscow ordered 32 Sukhoi Su-34s (Fullback) in 2008, followed by another for 92 such bombers in 2012. Plagued by problems, the service entry was much postponed and the type was declared operational only in 2014. Nevertheless, the 56 presently available aircraft enabled conversion of four operational squadrons to the type, with two more in the process of converting.

With its K-102 nav/attack system, V004 multifunction passive electronically scanned array, ventrally installed I255 B1/02 Platan laser- and TV-sight, and ability to haul up to 8,000kg (17,637 lb.) of weaponry on 12 hardpoints over a combat radius of 1,100km (683 miles), the Fullback is one of most powerful tactical bombers now flying. During recent operations over Syria, the type was demonstrated in service with brand-new KAB-500S-E GLONASS (satellite) guided bombs (equivalent to U.S.-made GBU-32 JDAM) and KAB-1500LG laser-guided bombs with 24N1 gimballed semiactive-laser-homing seekers. Protected by the L265 Khibiny-MV self-protection electronic countermeasures suite and designed with potent standoff and escort-jamming capabilities, the type can, to a certain degree, match the capabilities of the Grumman EA-6B Prowler in electronic warfare. It also, however, proved a handful to maintain, susceptible to FOD and dust, and much too complex and inflexible to be deployed on a rapidly changing battlefield. It, of course, offers plenty of space for further upgrades, and there is little doubt that the VKS will continue to invest in it considerably. For example, the Su-34 is slated for adaptation with the much-delayed Sych reconnaissance pod, so it should replace Su-24MR reconnaissance-fighters, which still equip four squadrons.

Unsurprisingly, the Su-34s were, meanwhile, deployed to perform several highly publicized long-range demonstration flights over Russia's extreme northern territories and power-projection operations in the Baltic and Barents Seas.

The backbone of the VKS's attack force is about 140 Sukhoi Su-25 Frogfoot attack aircraft, directly comparable to Republic's A-10 Thunderbolt II of the USAF. Designed as a subsonic, armored aircraft for close-air-support (CAS) to ground troops, most Frogfoots in question belong to the 10th series configuration, manufactured in the late 1980s and featuring improved survivability. Since 2006, many were overhauled and upgraded to Su-25SM/SM-1/SM-2 standard, but this is still lacking



About 140 Su-25SM/SM-1/SM-2s and Su-25UBMs form the backbone of the VKS's attack force. (Photo by Piotr Butowski)



PROJECTS FOR NEWLY DESIGNED ATTACK AND COMBAT-RECONNAISSANCE HELICOPTERS, ORIGINALLY DEVELOPED IN THE LATE 1980s, HAD TO BE RELAUNCHED IN THE SECOND HALF OF THE 2000s.

The Mi-8MTV-5-1s, such as the example seen here, represent one of the major production versions of this helicopter for the VKS. (Photo by Piotr Butowski)

compatibility with guided weapons, although it did bring compatibility with R-73 SRAAMs. Compatibility with guided weapons—including KAB-500S-E GLONASS guided bombs—was added only with service entry of the Su-25SM-3 variant in 2014, and presently the VKS appears planning to upgrade about 130 survivors to this standard. Remaining Su-25UB two-seat conversion trainers are expected to receive an overhaul and upgrade to the similar Su-25UBM. With a built-in service life of about 4,000 hours and low utilization for most of the last 20 years, most Su-25s have only about 1,500 hours on their airframe. Correspondingly, the type is likely to remain in service for at least another decade, if not longer.

Of Helos and UAVs

The majority of the Russian Aerospace Force's helicopter fleet is in similar condition. The backbone of the fleet remain hundreds of old Mil Mi-8 Hips for a wide range of tasks—from assault and close-air-support to utility and VIP transport—plus Mil Mi-24 and Mi-35M Hind gunships. Projects for newly designed attack and combat-reconnaissance helicopters, like Mil Mi-28N and Kamov Ka-52, originally developed in the late 1980s, had to be relaunched in the second half of the 2000s. With all the orders reported since 2005 totaling 167 examples, the Mi-28N is slated to completely replace Mi-24s and Mi-35Ms. The type is, meanwhile, operated by six squadrons. On the contrary, the future of the Ka-52 did not look bright for a long time until 2011, when Moscow announced a surprising decision to order 146 for delivery by 2020. Three squadrons are in the process of converting to the type.

The VKS is reasonably well equipped with unmanned aerial vehicles (UAVs) but still struggling to match the capability of its Western counterparts. The development of medium- and high-altitude long-endurance platforms proved a literal "mission impossible" for the Russian aerospace industry. Ironically, the VKS found itself with no solution but to purchase a few Israeli Aerospace Industries Heron UAVs and launch licence production of them. Even so, neither Herons nor any other of about a dozen of tactical UAV types is capable of replacing the capability provided by Su-24MRs. Thus, even if gradually replaced by Su-34s, Su-24MRs are likely to remain in service beyond 2020. Similarly, although the Russian aerospace industry successfully adapted several types of advanced navigation and targeting pods on Su-30MKI/MKMs manufactured for foreign customers, it is lagging in development of similar platforms for service with the VKS. None

About 150 Mi–24s—mostly Mi–24Ps and some older Mi–24D and V models—remain in service with the VKS. Lately, the fleet was reinforced through acquisition of about 50 newly built Mi–35Ms. (Photo by Chad Slattery/Check Six)

is expected to become available in significant numbers before 2020.

Force multipliers like AWACS and ELINT/SIGINT platforms remain low in numbers. Only 17 of 24 Beriev A-50 SRDLO (Russian for AWACS) aircraft are still in service, not nearly enough to provide sufficient coverage of the immensely long borders of the Russian Federation. Since 2006, the fleet is in the process of being upgraded to A-50U standard through introduction of the Shmel-M radar and a new, digital-computing system. With the reported capability of tracking up to 150 targets to a range of 600km (373 miles), however, the total effectiveness of the type is rather comparable with the legacy variant of Grumman E-2C Hawkeye, now considered obsolete in the West.

About a dozen old Ilyushin Il-18 airliners converted to Il-20 and Il-22 variants—operated by independent reconnaissance groups subordinated to the Main Intelligence Directorate—serve as primary ELINT/SIGINT gatherers and are yet to be replaced by the custom-tailored Tupolev Tu-214R, only two of which had entered testing by 2015.

Syria: Planning and Communication are Not Strong Suits

While there is no doubt that the Russian Aerospace



The Russian Ministry of Defense has placed a series of orders for the Mi–28N, totaling no less than 167 examples, to be delivered by 2020. (Photo by Piotr Butowski)



About 60 Tu-95MS strategic bombers—one of the icons of the Cold War—remain in service with the VKS. The Russians' primary weapons nowadays are Kh-555 cruise missiles. (Photo by Piotr Butowski)

Force remains a powerful military branch, much of its famed capabilities are available on paper only and are, at best, useful for airpower demonstrations: good for impressing reluctant Western politicians and the think tanks that advise them but for little else. In real combat operations, the VKS is unlikely to deliver promises made by Moscow's propaganda machinery and is hopelessly outmatched by such services as the USAF.

Indeed, recent deployment of a VKS aviation group in Syria demonstrates a number of shortcomings. While there is no doubt that pilots of Russian fighter-bombers have received more training in recent years than in the decades before (annual flight-training hours were back to between 110 and 130 hours in 2013–14) and while the Mideast deployment surprised and impressed Western observers, massively multiplied the total firepower of the regime of Syrian President Bashar al-Assad, and bolstered morale of the war-weary hodgepodge of militias remaining loyal to it (and operated under official title of "Syrian Armed Forces"), its overall effectiveness remains very limited.

The Russians have occupied the Hmeymim Air Base (military side of Bassel al-Assad International Airport) of the Syrian Arab Air Force, which is 25km (15.5 miles) south of the biggest Syrian port of Latakia. While having two runways, the facility lacks the necessary ammunition depots and hardstands for the 36 fighter-bombers and one ELINT/SIGINT gatherer sent there. Consequently, Russians had to leave their aircraft exposed in a long row parked down one of two runways until necessary dispersal facilities were constructed. At the same time, they had to build a new heliport about 10km (6.2 miles) farther north, for deployment of 14 helicopters.

Lacking A-50 SRDLOs that could be deployed for expeditionary purposes, air defenses of the two bases had to be provided by four Su-30SMs and the guided-missile cruiser *Moskva* until an S-400 *Triumpf* (SA-21 Growler) SAM site was constructed at Hmeymim. The latter installation has a theoretical engagement range of nearly 400km (240 miles) but suffers poor radar coverage: Positioned low at the coast of the Mediterranean Sea,



On average, about a dozen out of 16 Tu-160s are operational. The fleet is in the process of being upgraded to Tu-160M standard. (Photo by Piotr Butowski)



THE RUSSIAN PERFORMANCE IN SYRIA POINTS TO POOR COMMAND AND CONTROL CAPABILITIES, RESULTING IN POOR SITUATIONAL AWARENESS AND POOR COMBAT EFFECTIVENESS.

its view over the battlefields in central and eastern Syria is obstructed by the 2,000m- (6,560-foot-) high chain of Anti-Lebanon Mountains.

Despite deploying dozens of UAVs for reconnaissance over Syria, the Russians have immense problems finding their targets in insurgent-held areas, most of which are between 20 and 50km (12 to 31 miles) east and north of the Anti-Lebanons. The drones have proven nearly incapable of finding more than a handful of targets in the parts of the country controlled by the self-declared Islamic State (also known as IS, ISIS/ISIL, or Daesh), most of which are 200km (125 miles) or more east from their main base.

Excepting a few dozen CAS sorties by Mi-24 helicopter gunships early on, more than 95 percent of some 2,000 sorties reportedly flown by VKS fighter-bombers in Syria between late September and mid-November 2015 were launched, according to daily tasking orders typically issued 36 to 48 hours before the mission began. Retasking of aircraft that are already airborne is unheard of. This points to a dramatic lack of real-time intelligence-gathering capability and a complete inability of the prompt delivery of collected intelligence to warfighters. Worse yet, a number of Russian air strikes hit forces loyal to Assad, with devastating consequences.

Problems Are More than Hardware-Related

Overall, the Russian performance points to poor command and control capabilities, resulting in poor situational awareness and poor combat effectiveness. Negative products of this system were clearly illustrated during the first reported encounter between two USAF F-22 Raptors and two VKS Su-30SMs over Syria in late October 2015. The Raptors approached within a mile and a half of the Russian formation before being visually detected, which would have been much too late in combat. Since that encounter, the Sukhois patrolling the Turkey border no longer recklessly lock their radars on Turkish F-16s patrolling on the other side, as they did in early October 2015.

Such situations are a result of U.S. Central Command (CENTCOM) operating a wide range of advanced sensors. They include over-the-horizon radars, AWACS aircraft, and long-range UAVs, all of which provide American forces with insight that penetrates much deeper into Syrian airspace than is available to the Russians. Among other things, this means that commanders at CENTCOM are able to position their fighters so that they remain undetected by Russians.

All of the above are shortcomings of the Russian system. The Russians have an obvious inability to provide timely and precise intelligence to their warfighters when that information has repeatedly proven far more effective than whiz-bang aircraft, missiles, or even bullets. In short, the side that remains "unseen" while still knowing where its enemies are is usually the one that not only wins battles but also wins wars. ✠

By 2020, Moscow plans to purchase 60 PAK-FA stealth fighters based on the T-50 design. This project, however, is badly behind schedule, and the IOC of December 31, 2016, is clearly unrealistic. (Photo by Katsuhiko Tokunaga/ Check Six)

The Russians in Syria

Not As the Media Would Have Us Believe

BY **TOM COOPER**

EDITOR'S NOTE:

The latest round of Russian operations in Syria signalled the first combat deployment for many ex-Soviet Cold War aircraft that have been well known in the West since the 1980s. Most aircraft types in the Russian inventory have now joined the fray. It's hard to get a clear picture of what is actually happening over there, so *Flight Journal* asked warfare analyst Tom Cooper to describe what the Russians are attempting to hit, using what means and with what results.

The official line of the Kremlin is "clear"...sort of: Russia is bombing all "terrorists" in Syria but especially the IGIL (Russian shorthand for "Islamic State"). The Russian media are making it even clearer: All Russian military operations in Syria are targeting IGIL. Most Russian, but also many Western, observers understand that the Russian targeting list includes "all opponents of the regime of [Syrian] President Bashar al-Assad," especially the al-Qaeda-linked Jabahat an-Nusra, and the U.S.-, Turkey-, and Saudi-supported Free Syrian Army (FSA), considered "terrorist" by not only the Syrian regime but the Russians, as well.

The Reality Doesn't Match the Public Relations

A case-by-case study of Russian operations in Syria reveals a completely different picture than that portrayed by the public-relations efforts. Namely, out of more than 4,500 combat sorties flown by Russian Air Force (VKS) aircraft between September 30 and December 15, 2015, a mere 200, possibly less, have hit targets within the parts of Syria held by the Islamic State of Iraq and the Levant (ISIL). Even then, nearly 90 percent of targets in question cannot be clearly identified as being ISIL-related; others included carpet bombing of two Syrian towns along the border with Iraq and several minor towns north of Aleppo, where dozens of civilians—but not a single ISIL combatant—were killed. One of the Russian attacks on ISIL actually resulted in bombardment of a purification plant providing fresh water for 3.5 million Syrians still living in Aleppo and an incomplete gasoline refinery southeast of Dayr az-Zawr.

Considering that they might be interested in hitting the al-Qaeda-linked Nusra, the Russians are amazingly consistent in not managing the task. The vast majority of their air strikes are, instead, aimed at units fighting against Assad under the flag of the moderate FSA and, even more so, the civilian population living in areas controlled by the same.

Other Russian targets are, tragically, even much more maddening to report. Douma—a densely populated suburb of Damascus, full of refugees from surrounding areas and held by moderate Muslims of the Islamic Front—was targeted by a particularly savage series of air strikes in early December 2015. During those missions, Tupolev Tu-22M3 bombers of the VKS carpet-bombed in cooperation with MiG-23BN and Su-24MK2 fighter-bombers of the Assadist air force, making near-exclusive use of RBK-250-270 antipersonnel cluster bombs (CBUs). Unsurprisingly, more than 100 civilians were massacred, including about 40 children in one of the few elementary schools still open in Douma.

Because of the emphasis on such "combat



The Tupelov Tu-95 Bear is one of the few operational combat aircraft that predates even the B-52. The Bear, which first flew in 1953, is the backbone of Russia's heavy bombing capabilities. It is launching cruise missiles from Iranian airspace into Syria but with little targeting success due to missile failures. (Photo by Piotr Butowski)

CONSIDERING THAT THEY MIGHT BE INTERESTED IN HITTING THE AL-QAEDA-LINKED NUSRA, THE RUSSIANS ARE AMAZINGLY CONSISTENT IN NOT MANAGING THE TASK.

operations" and because a large number of the Russians' bombs (especially CBUs) are failing to detonate, the Russian aerial campaign in Syria has shown only minimal effects upon the battlefield. On the contrary, after causing the deaths of nearly 1,000 Syrian civilians, the bombing only provoked another wave of more than 200,000 Syrians to flee over the border to Turkey.

Their "Bigger Hammer" Approach Has Not Been Effective

In mid-November 2015, the Kremlin, either displeased and frustrated by the ineffectiveness of Russian bombing or satisfied by precisely the latter result, began deploying huge (and ancient) Tu-95MS Bears and supersonic Blackjack Tu-160 strategic bombers for cruise-missile attacks on insurgent-held population centers in Syria. These have not gone well.

By mid-December 2015, the bombers had flown 145 combat sorties to Syria and fired over 200 Kh-555 and Kh-101 cruise missiles. The Tu-95s usually launch weapons from Iranian airspace, while Tu-160s take the long route along Europe's border to fire their missiles (usually Kh-101s) from international airspace over the Mediterranean Sea. Largely ignored in the public press is that a surprising number of the cruise missiles malfunction: During the first such strike, four out of 34 missiles in question crashed before even leaving Iranian airspace. In another case in early December, only one of six missiles fired against one objective hit its target, while five others malfunctioned. From the standpoint of Assad and Russian President Vladimir Putin, this might not matter because the Western public is not paying attention to these problems. Nevertheless, on December 6, 2015, two Russian cruise missiles hit Assad-regime positions in the Aleppo area, causing nearly 50 fatalities, a fact that clearly did not go down well in Damascus.

Russian operations against insurgent units deployed along the 1,000km-long front lines in



Aleppo and Idlib have been minimal. The VKS is attempting to hit headquarters and storage depots rather than deployed units. In most cases, ironically, the Russian bombing of insurgent positions along the actual ISIL front lines enabled ISIL to advance. While causing relatively few losses, because insurgents have already adapted to similar operations of the Assadist air force and have learned to disperse their units and facilities, it still "kept them down." In effect, the Russian bombing provided support for ISIL.



The Sukoi Su-24M has been Russia's go-to attack bomber since its introduction in 1974. In Syria, it is being flown by the Syrian Assadist air force, primarily dropping antipersonnel cluster bombs. (Photo by Piotr Butowski)

Frustrated by such results, the Kremlin began feeding the press inaccurate information, which portrays its forces as providing close air support for the FSA, a force that not only Putin declared as "nonexistent" but also even various Western politicians supposedly have had major problems locating in Syria. Out of four FSA groups listed by the Russians, three have never existed, while one is actually the U.S.-supported Kurdish militia, which never operated in alliance with insurgents.

Overall, despite their claims that each bomb, missile, and cruise missile fired over Syria are 100 percent hits, the Russians actually have very little to show for their massive effort, except for the interruption of vital supply lines for civilian populations living in insurgent-held areas in the Aleppo and Idlib provinces. While certainly an impressive airshow, the Russians' operations in Syria cannot be described in the military sense as even a "successful fire-power demonstration."

The Coalition Is Trying, but...

In comparison, the U.S.-led coalition fighting ISIL operates about 110 combat aircraft, the majority of which are based in Bahrain, Qatar, and the United Arab Emirates but also are in Jordan and Turkey and at RAF Akrotiri on Cyprus. The primary targets of most American, British, French, Canadian, Australian, Dutch, Italian, and other participating air forces operating under Operation Inherent Resolve remain ISIL ground units in Iraq. Air strikes against targets in Syria have greatly decreased in intensity since the massive defeat of ISIL in the battle of Ayn al-Arab (better known in the West by its Kurdish name: Kobane) in spring 2015. It was a result of not only the de facto withdrawal of most of Arab contingents from that battlefield—except that of Bahrain—but also the coalition's preoccupation with the battle for Ramadi in central Iraq.

Although much more precise with regard to targeting ISIL than the Russians could ever claim, overall effectiveness of the coalition's efforts remains limited to the destruction of extremists' nodes in western Iraq. Elsewhere, ISIL has even improved its recruiting efforts and is still largely free to continue earning handsome profits from selling oil and gas to the Assad regime and to Kurds in northern Syria and Iraq. In other words, all efforts aimed at limiting or eliminating ISIL by all concerned are being continually frustrated and are ineffective. It would appear, moreover, that Operation Inherent Resolve is short on actual resolve. ∓

Tom Cooper is an Austrian aerial warfare analyst and historian. Following a career in worldwide transportation business—during which he established a network of contacts in the Middle East and Africa—he moved into narrow-focus writing and analysis on small, little-known air forces and conflicts, about which he has collected extensive archives. That resulted in a specialization in such Middle Eastern air forces as of those of Egypt, Iran, Iraq, and Syria, plus various African and Asian air forces. Lately, he has coauthored an in-depth analysis of the Chinese air force and naval aviation, their equipment, markings, armament, and orders of battle, resulting in the book Modern Chinese Warplanes.

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Frank Hawks's Amazing Gamma

The Northrop Sleek Greeks

BY **JOE GERTLER**

Jack Northrop, one of aviation's pioneer geniuses, believed that the key to performance was clean aerodynamics. The beautiful, streamlined designs of his Greek letter series—Alphas, Betas, Deltas, and Gammas—coming at the end of the biplane era were stunningly futuristic.

By the 1930s, Frank Hawks was well established and famous as an Army and Navy pilot, air racer, and record setter, who was an aviation celebrity to the public. As such, he was a darling of the newspapers, magazines, and movies of the era. The Texas Company enjoyed a successful association with Hawks, with the "Texaco 13" Travel Air "Mystery Ship" racer being the most famous of that series. Hawks envisioned a new design for a high-speed mail and cargo plane, also suited for passengers and air racing. His concept focused on a "Super-Mail Express," with an in-line engine preferred but a radial would have been acceptable. The performance goals were 220mph minimum speed, 70mph landing speed, and a ceiling in the range of 15,000 to 20,000 feet.



The Northrop Corporation in Inglewood, California, was just reorganizing in 1932, and its first plane would be Hawks's Gamma 2A. It would be an improved version of the smaller, six-passenger Alpha mail plane. The power would come from the newly designed Wright R-1510 Twin Whirlwind, producing 700hp at 2,300rpm. Hawks had no trouble getting the Texas Company to provide $40,000 (in 1931 dollars!) to sponsor his plane as the Texaco "Sky Chief." When finished, it had a maximum speed of 248mph, cruised at 220mph, and could land at 55mph with full-span split flaps. It had a range of 2,500 miles.

As expected, the futuristic wonder incorporated numerous innovative features. Northrop had determined that a fully streamlined fixed gear would perform better than a heavy, complicated retractable gear. The bottom halves of the gear fairings were attached to the wheels, and that fairing moved up and down within the fixed upper-wheel fairing, always leaving a minimum of tire hanging out to cause drag. As one of the first two Gammas, it incorporated "park bench" ailerons. The purpose of mounting the ailerons in small pylons, above the wing surface, was to allow the entire length of the wing's trailing edge to have a full-span split flap, which contributed mightily to the low landing speed. Northop's monocoque metal fuselage was a revival of an old design: the Deperdussin racer of 1913. In the absence of today's computers and glass flight decks, the front cockpit had a slide rule attached to the panel. Hawks's plane even had a streamlined tailwheel fairing. He flew the "Sky Chief" nonstop to Floyd Bennett Field in Brooklyn, New York, from Mines Field in Los Angeles, California, in 13 hours, 26 minutes, and 15 seconds on June 2, 1933.

Some 62 Gammas were built, many of which featured custom configurations. The Chinese government purchased 36 Gamma 2Es in 1934, seeing them as fighter/bombers. The Gamma series so thoroughly outclassed many of its contemporaries that it was a popular choice for ambitious pilots and special missions. Lincoln Ellsworth's Gamma 2B was constantly in the headlines and newsreels as he used it for his 1932 Antarctic explorations. Howard Hughes set another record, flying a Gamma from Los Angeles to Newark, New Jersey, and famed aviatrix and racer Jackie Cochran flew her 2G in the MacRobertson Race from England to Australia.

The Texaco "Sky Chief" was natural metal color with red and green trim. It was later sold with a goal of racing it in the 1936 Bendix Air Race, but it was destroyed when an empty fuel tank exploded.



Jack Northrop's visionary streamlined monocoque beauties hastened the demise of the steel-tube and fabric biplane designs. The lack of forward visibility, due to the extreme rearward cockpit position, must have made it a white-knuckle experience to take off and land. (Photo courtesy of Joe Gertler)

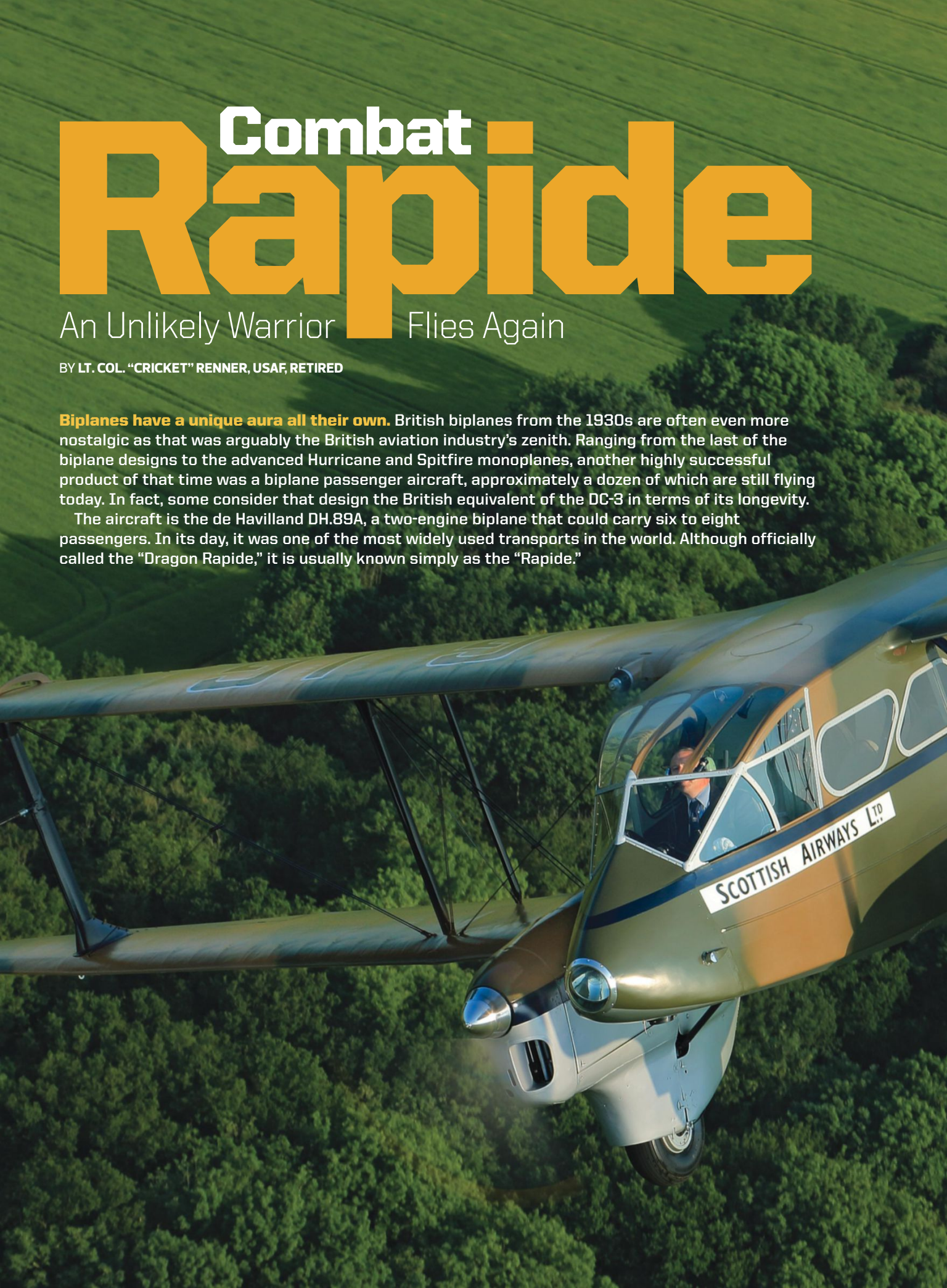
Combat Rapide

An Unlikely Warrior Flies Again

BY **LT. COL. "CRICKET" RENNER, USAF, RETIRED**

Biplanes have a unique aura all their own. British biplanes from the 1930s are often even more nostalgic as that was arguably the British aviation industry's zenith. Ranging from the last of the biplane designs to the advanced Hurricane and Spitfire monoplanes, another highly successful product of that time was a biplane passenger aircraft, approximately a dozen of which are still flying today. In fact, some consider that design the British equivalent of the DC-3 in terms of its longevity.

The aircraft is the de Havilland DH.89A, a two-engine biplane that could carry six to eight passengers. In its day, it was one of the most widely used transports in the world. Although officially called the "Dragon Rapide," it is usually known simply as the "Rapide."





After a 27-year restoration, Mark Miller flies his de Havilland DH.89A Dragon Rapide over the lush English countryside. Seeing service with Scottish Airways during World War II, G-AGJG wears its regulation wartime color scheme for civilian aircraft: camouflage with red, white, and blue stripes beneath the aircraft identification. (Photo by John Dibbs/planepicture.com)



A pair of Rapides waiting to take to the air again. This would have been a common sight at English airfields in the prewar era as many commercial operators used the aircraft. (Photo by Darren Harbar)

Rapide Genealogy

De Havilland produced many biplanes during the 1920s and 1930s, mostly aimed at the civilian market. One of the most famous is the DH.82 Tiger Moth, with more than 8,300 biplane trainers built. The need, however, for a light commercial aircraft that could operate at a profit (without government subsidies) was not met until the single-engine DH.83 Fox Moth in 1932. Capable of carrying four passengers in an enclosed cabin and the pilot in an open cockpit, the Fox Moth's success pointed to the need for a twin-engine aircraft of six- to eight-seat capacity. That effort produced the DH.84 Dragon, a very successful design that first flew in 1932 and entered service in 1933.

WITH THE ARRIVAL OF THE U.S. EIGHTH AIR FORCE IN ENGLAND IN EARLY 1942, THERE WAS AN IMMEDIATE REQUIREMENT FOR A LIGHT TRANSPORT AIRCRAFT FOR THE FRIENDLY INVADERS.

De Havilland's next design transport design was the DH.86 Express, a large biplane with four 200hp Gipsy Six engines. Seeing limited success, de Havilland decided to update the Dragon in 1934, simultaneously creating a scaled-down version of the DH.86. It was the DH.89 Dragon Rapide. The prototype first flew on April 17, 1934, and Hillman's Airways Ltd. flew its first revenue flight only three months later on July 13. De Havilland improved the design in 1936 by adding trailing edge flaps, designating the new model the DH.89A. De Havilland built 205 Rapides before the start of World War II.

Rapides were widely used by airlines all over the world. They opened up Africa and the South Island of New Zealand to air travel. They were also favored by both businessmen and royalty as personal transports. In 1936, Edward, Prince of Wales, ordered two Rapides, which became the King's Flight.

During WW II, the Royal Air Force (RAF) commandeered nearly all existing Rapides and





ordered more than 500 more, bringing total production to 728. The military name for the type was "Dominie." The RAF and Royal Navy used Dominies for communications and transport as well as radio and navigation trainers.

With the arrival of the U.S. Eighth Air Force in England in early 1942, there was an immediate requirement for a light transport aircraft for the friendly invaders. The RAF loaned six DH.89s to the Eighth. They were operated by the 27th Transport Group until August 1944. To honor that service, the National Museum of the U.S. Air Force in Dayton, Ohio, has a Dominie on display.

Before WW II, the Spanish government forces used Dragon Rapides in the 1936–39 civil war. A 1986 movie titled *Dragón Rapide* details the lead-up to the Spanish Civil War, including a DH.89 as a star. Additionally, in the 1948 Arab-Israeli War, the Israeli Air Force used a Dragon Rapide as a light bomber.

After WW II, many Dragon Rapides were put into civilian service again, mostly by smaller airlines, as well as for charter work, air survey, executive transport, and freight. In Canada, they were also operated on floats and skis. Rapides also became popular with parachute clubs for those wanting to jump out of perfectly good airplanes!

The DH.89 Dragon Rapide's all-wood construction of plywood and spruce made it a simple design and an economic and durable aircraft.

The unique single-place cockpit of the Rapide. Because there are no dual-controlled versions, all Rapide pilots learned by watching their instructor "over the shoulder," then had to figure out the rest themselves! (Photo by Darren Harbar)

Rapide versus Heinkel

While many Rapides were used in various military roles during WW II, some civilian Rapides were allowed to continue flying for U.K. airlines as part of the Associated Airways Joint Commit-

tee, an organization coordinating Britain's wartime commercial air services.

According to Capt. E. E. Fresson, airline pioneer and Scottish Airways Rapide pilot, the company's aircraft were "camouflaged earth and green colour, and the top wings merged with the peat and heather surroundings. Looking down from a height, it was very difficult for enemy aircraft to spot us." In addition, "the windows of all passenger aircraft, under wartime regulations, were painted over, and only the cockpit windows were clear." Because its regular route was over the Royal Navy base at Scapa Flow, this prevented any potential German spies gaining intelligence for the mere price of an airline ticket!

In the fall of 1940, a Scottish Airways Rapide was involved in an exceptional incident. Capt. Henry Vallance left Inverness with a full load of passengers for Orkney. Flying above a low cloud deck, Vallance glanced down to see a German Heinkel He 111 bomber climbing out of the mist. The Rapide was unarmed and slow compared to the Luftwaffe aircraft. The German pilot, spotting the Rapide, started a climbing turn to attack, which would surely have finished Vallance, his seven passengers, and a radio operator. Fortunately, Vallance realized the Heinkel had no rear gunner and so determined that if he could stay on the bomber's tail while his radio operator was sending SOS signals, a fighter might arrive in time to chase the German away.

Vallance dove on the bomber's tail and got into position behind and below the German. For the next five minutes, Vallance had his hands full keeping on the Heinkel's tail. Suddenly, the German left the fight and headed out to sea. Vallance breathed a deep sigh of relief and headed back to Inverness, obviously shaken by the near-death encounter. As the passengers exited the plane, they asked why they had returned to Inverness—they were completely unaware of what had occurred beyond the painted-out windows! When told of their narrow escape, they were somewhat subdued. After a short rest, Vallance and his passengers set off again for Orkney, safely reaching their destination.

Restoration Life Sentence

DH.89A Dragon Rapide G-AGJG began as RAF Dominie X7344 in 1941. It was used by No. 1 Camouflage Flight at RAF Hendon, presumably to assess military and industrial sites camouflage measures. In late 1943, X7344 was transferred to the Northern Division of Scottish Airways with civilian registration G-AGJG. Used to fly scheduled services between Inverness and the Orkney and Shetland Islands, the aircraft was painted in the regulation wartime color scheme for civilian aircraft: camouflage with red, white, and blue stripes beneath the aircraft identification, with all the passenger windows painted white.

In 1947, the small airlines were nationalized, and their aircraft transferred to British European Airways (BEA). G-AGJG continued to fly the island routes for a while until being sent to Croydon Airport. From 1952 until 1957, it was



Many civilians experienced their first flight in an airplane in G–AJGJ. It was flown from 1952 to 1957 by Island Air Services for pleasure flights at Heathrow Airport. (Photo courtesy of John Dibbs Archives)



Mark Miller at home in his pride and joy: de Havilland DH.89A Dragon Rapide G–AGJG. Mark's first impression on his first flight were "of the fabulous all–round view and of an absolute symmetry about the controls, the panel, and the centerline pilot's seat." Mark says that it flies like a twin Chipmunk—high praise, indeed! (Photo by Darren Harbar)

Modern-Day Dragon Rider

Mark Miller describes his and his dad's training to fly the DH.89A Dragon Rapide and what it's like to fly

"For Lesson One of our Type Conversion—something of a 'do not try this at home' episode—David and I rode in the cabin while Lee Proudfoot climbed us up to 4,000 feet to demonstrate a little general and asymmetric handling, including stalls." After a bit, Lee traded places with David first and then Mark—not an easy task considering the cockpit has a single seat in the front of the fuselage.

Upon taking the pilot's seat, Mark's "immediate impressions were of the fabulous all-round view and of an absolute symmetry about the controls, the panel, and the centerline pilot's seat. Selection of the straight and level attitude, which I had expected to be difficult with no nose ahead, simply suggested itself. In turns, the only challenge was to avoid imposing excessive bank angles with the four remarkably crisp ailerons, the stability in roll being just about neutral. I muttered to myself, 'This is a twin Chipmunk!'

"A learning point was that the stall occurs at a relatively shallow pitch attitude, especially as viewed from G-AGJG's 5-inch-high seat cushion. This confirms the accumulated wisdom that three-point landings are just not on with a Rapide."

After trying the Rapide in the air, the next flights involved take-offs and landings, with David "soloing" first (with Lee in a passenger seat behind) and then Mark.

Mark continues, "Taxiing is historically the regime in which Rapides are most readily bent. Anyone doubting this assertion need only scrutinize the Royal Navy Dominie accident records." The Rapide has a lever to apply brakes rather than the typical American system of toe brakes.

"We preset two clicks of brake before moving off—maybe three, if it is really windy—secure in the knowledge that sudden full rudder will not come close to locking a wheel."

"Some odd sensations of sideways movement were unnerving at first (due to sitting far ahead of the wheels), but controllability was excellent and much like a Chipmunk. A tendency to taxi too fast, because the eye line was so much higher from ground level than familiar, had to be resisted.

"I lined up on Duxford's grass and brought the aircraft gently to a halt while getting my head around the whole prospect. First mistake! The then-unequal brakes slewed us a fraction off runway heading and misaligned the tailwheel. [I go] forward to sort this out, brakes fully off, a deep intake of breath (which I have no recollection of letting out!), then up with both engines to about 1,400rpm, steering with slight differential throttle movements; finally, once going at a jog trot and tracking straight, smoothly to full power with both together, the Rapide has lifted off on its own but rather tail low. This was not a misjudgment of attitude so much as my failure to raise the tail quickly and positively enough during what is, at light weight, only a few moments of ground roll."

After climbing to pattern altitude, "I knew that the force required to operate the flap lever is extraordinarily high, so I eased the speed momentarily to 65 knots on base leg to reduce the air loads. [I went] back up to 70 knots for the final turn, then tapering to precisely 63 as a threshold speed. I skimmed over the ground still unsure of exactly where my wheels might be. A gentle tugging feeling from far behind suddenly provided the answer, the cue to check forward to hold it on. What a simply fabulous aeroplane!"

flown by Island Air Services for pleasure flights at Heathrow Airport. According to the current owners and pilots, David and Mark Miller (father and son), G-AGJG flew parachutists at Thruxton and Halfpenny Green Airports during the 1960s. It was flown, according to Mark, "until every shred of useful life had been extracted, literally down to the last strand of control cable!"

By 1975, G-AGJG had deteriorated beyond economic repair, rotting away at Biggin Hill. Some early Duxford Aviation Society (DAS) members were raiding a scrap Bristol Britannia for its cabin trim and found the Rapide. Mark comments that "in a fit of timely optimism," they orchestrated a rescue and the aircraft was flown to Duxford in August 1975. He continues, "The deal was that the DAS would take the Rapide on a long lease, 'skilled volunteers' [sic] would undertake a Certificate of Airworthiness renewal and the members could fly around in it for the remainder of the term. Simple! Such was the merry naivety of the preservation scene at that time."

"THE BRITTLE FUSELAGE PLYWOOD WAS A PATCHWORK OF DODGY REPAIRS, AND THE CABIN FLOOR WAS PARTING COMPANY WITH THE SPRUCE LONGERONS. EXPERIENCED RESTORERS WOULD HAVE RUN A MILE!"

The volunteers started the restoration in 1977, but it soon became obvious that the aircraft was in even worse condition than expected. Ribs were oil-soaked by many parachutists' boots; earlier "repairs" were poorly done; rigging wires were rusty; seized pulleys had frayed the control cables; many metal tube parts were corroded beyond hope; and "the passenger seats had long since disappeared. The brittle fuselage plywood was a patchwork of dodgy repairs, and the cabin floor was parting company with the spruce longerons. Experienced restorers would have run a mile!" Fortunately, Mark says, G-AGJG's "prime movers had insufficient knowledge to see when they were beaten. All the bits moved into a workshop for what became a restoration life sentence."

Meanwhile, Mark says, "We first tackled something we thought would be easy—the rudder—only to find that the rusty trailing edge came away stuck to the back of the fabric!" By now David, the father/owner/pilot of the team, had started working toward his private pilot's license on the Cambridge Flying Group's Tiger Moths, with a starry eye of flying the Rapide. Mark started his Tiger Moth training in 1981.

Meanwhile, Mark adds, "The Rapide continued with the fuselage being set up on trestles, checked dimensionally, and then entirely de-skinned and re-plyed along the top and sides, piece-by-piece in 50-inch steps. By the mid-1980s, we realized that the rebuild could not be finished with any worthwhile period of lease remaining." So to relieve the DAS of the burden and to move the



Used for carrying six to nine passengers, the Rapide was a successful commercial aircraft with airlines all over the world as well as with the British and American military. De Havilland built 728 Rapides. (Photo by Darren Harbar)



G–AJGJ with its passenger windows painted white, as they were during World War II. Due to the sensitive nature of the Rapide's routes over the Royal Navy facilities at Scapa Flow, this prevented any German spies from gathering valuable intel for the price of an airline ticket! (Photo by John Dibbs/planepicture.com)

project along, David and Mark Miller purchased the project in 1986.

Mark says, "Our spares searches—literally from America to Zaire—involved many colorful characters. Christmas 2003 saw smiles all around as the finished wings were at last fitted to the fuselage. Tempering the celebratory mood was the news that our CAA Surveyor [the British equivalent of an FAA Maintenance Inspector] had only six months before his retirement—we clearly had a now-or-never situation. Early 2004, therefore, became a blur of assembly, adjustment, inspection, and testing, happily with few snags thanks to detailed preparation at all earlier stages."

The end result of their 27 years of labor is a "zero-timed" Dragon Rapide, including both Gipsy Queen III engines. According to Mark, "Every square inch of fuselage, fin, and tail plane plywood is new, as are most of the wing leading edges and stub plane wooden structures, but many original DH spares are incorporated. Irish linen covering and the traditional belly lacing method were retained for authenticity."

The Dragon Returns to the Skies

Henry Labouchere was the pilot for G-AGJG's first post-restoration flight on June 19, 2004. Mark says that he absolutely rejoiced: "After a hop, skip, and a jump, our creation was up and away. An unexpected feeling of calm came over me, whether through confidence in our work or because, for the first time in years, we had nothing to do, I couldn't decide!"

David and Mark earned their Rapide wings shortly after. Mark tells us that "Under Lee Proudfoot's expert tutelage, my checkout on the Rapide was a momentous but uneventful affair, notwithstanding the obvious lack of dual controls, and on August 15, father and son had the great satisfaction of going 'solo' one after the other; my father went first! Dragon Rapide G-AGJG's return to the air could have had no happier postscript."

Since being restored to flying, G-AGJG has participated in some spectacular events. It led a rare six-ship formation of Rapides over Duxford's Flying Legends Airshow in 2004, and it led the official WW II 60th Anniversary Commemorative flypast over London and Buckingham Palace on July 10, 2005. Furthermore, the long restoration of G-AGJG spawned the foundation of de Havilland Support Ltd., a company based at Duxford that uses original factory-design data as a working technical archive to assist piston-engine de Havilland airplanes worldwide.

Unbiasedly, Mark concludes, "The Dragon Rapide achieved a truly brilliant and enduring combination of good looks, commercial usefulness, and, as we now realize, delightful handling. On a scale of one to 10, the Millers would award de Havilland a 15!" ✢

John Dibbs would like to thank Mark and David Miller and Darren Harbar as well as Tim Ellison, who flew the cameraship.

XT3D: The Ugly Orphan

BY **JOE GERTLER**

At the beginning of the 1930s, the U.S. Navy was seeking to replace its aging fleet of approximately 150 Martin T4M torpedo bombers. In June 1930, it ordered the newly designed XT3D model from Douglas. Only one was built, but it was continually modified to create many versions with significant differences.

The airplane, BuNo 8730, was initially delivered as the XT3D-1 with a Pratt & Whitney R-1690, nine-cylinder, single-row Hornet radial engine of 575hp. With a 50-foot wingspan and a maximum takeoff weight of just under 8,000 pounds with torpedo, the Navy rejected it as underpowered with unacceptable performance. The large biplane carried a crew of three, including a bomber/gunner at



With its crew of three, the XT3D-2 had defensive machine guns at both front and rear. No planes were ordered for production after this protoype showed poor perfomance, but it continued to be used by the Navy for engine and bombing-system testing for 10 years. The barely visible side marking of "N.P.G. DAHLGREN" referred to the Naval Proving Ground facility in Virginia. (Photo courtesy of Joe Gertler)

the front, pilot in the center, and another gunner in the rear cockpit. It carried .30-caliber machine guns in the front and rear, with a 1,835-lb. torpedo or an equivalent load of bombs.

In 1933, the aircraft was resubmitted to the Navy as the XT3D-2, with the significant improvements of a new Pratt & Whitney XR-1830-54, 14-cylinder, Twin Wasp radial of 800hp. The center and rear cockpits were enclosed, and wheel pants were added. It followed the older construction method of a metal fuselage with fabric covering. At that time, metal or monocoque construction was gaining favor with designers.

Throughout numerous engine changes, the XT3D was considered unusually ugly with poor streamlining. Many of the different engine cowls looked too small for the plane and were much smaller diameter than the large fuselage behind them. Most of the noses looked "pinched." Even with the massive increase in horsepower, the performance of the XT3D-2 was still unacceptable. The Navy was already turning its focus on dive-bombers to provide new tactics. But surprisingly, the "orphan" torpedo bomber remained in service for 10 years, until 1941, when it was relegated to use for instruction.

Were it not for the labels "8730" and "XT3D-2" clearly marked on the tail, the identification of this aircraft photo would be cause for confusion. As submitted in 1933, it had a much smaller ring cowl on the engine, wheel pants, and a 2-blade metal propeller. This image is the only known photo of the XT3D-2 with full cowling and air scoop, mated to match the diameter of the fuselage, and with a 3-blade propeller. It also has no wheel pants.

This one-of-a-kind Douglas torpedo bomber had a span of 50 feet, a length of 35 feet 6 inches, and a height of 14 feet. The speed was 142mph with a range of 748 miles.



Percival Mew Gull

Britain's Mini Speed Demon

BY **GEOFF JONES**

The 1930s were a golden era, pushing the boundaries of sophisticated design in the quest for speed and air race glory. The de Havilland Aircraft Company excelled with the DH 88 Comet G-ACSS "Grosvenor House," which won the prestigious 1934 London to Melbourne (Australia) MacRobertson Air Race. The King's Cup Air Race, inaugurated in 1922 for a trophy initially presented by King George V, became the most important and widely publicized British air race. The quest for intercontinental records also continued unabated until the outbreak of World War II in Europe.

The Mew Gull: A Winning Design

Prime among European racing and record-breaking aircraft of the era was a single-seat, low-wing monoplane: the Percival Mew Gull. Only six were built by Edgar Percival's company at Gravesend, Kent, between 1934 and '37: the E1 prototype, the E2, then three E2Hs, and finally the much-refined E3H (G-AFAA). Victories for the type in the 1937 and '38 King's Cup race were significant. Three were entered in the 1936 Schlesinger Race from Portsmouth, England, to Johannesburg, South Africa, in connection with the Johannesburg Empire Exhibition. As war clouds gathered, the epitome of aviation records was broken in February 1939 by Alex Henshaw in Mew Gull G-AEXF, flying from Gravesend near London to Cape Town and back—a 12,754-mile flight in a record time of 4 days, 10 hours, and 16 minutes (including one nonflying day).

The previous record was set in November 1937 by Flying Officer A. E. Clouston and Betty Kirby-Green, who flew the rebuilt and renamed DH 88 Comet G-ACSS "The Burberry" to the Cape and back in 5 days, 17 hours, and 28 minutes. G-AEXF survived the war stored in France, and after many subsequent crashes and rebuilds, it came into the ownership of Rob Fleming. In 2003, it was shipped to the United States for a "demonstration race" at Reno, Nevada; Fleming sold 'XF in October 2013, and it still flies, now in the care of The Shuttleworth Trust at Old Warden, United Kingdom.



The Percival Mew Gull's acceleration and speed is extraordinary—its contemporaries couldn't touch it in the 1930s' air races in which it competed. The tail can be raised at take-off after just 160 feet. (Photo by Darren Harbar)

Cloning an Icon

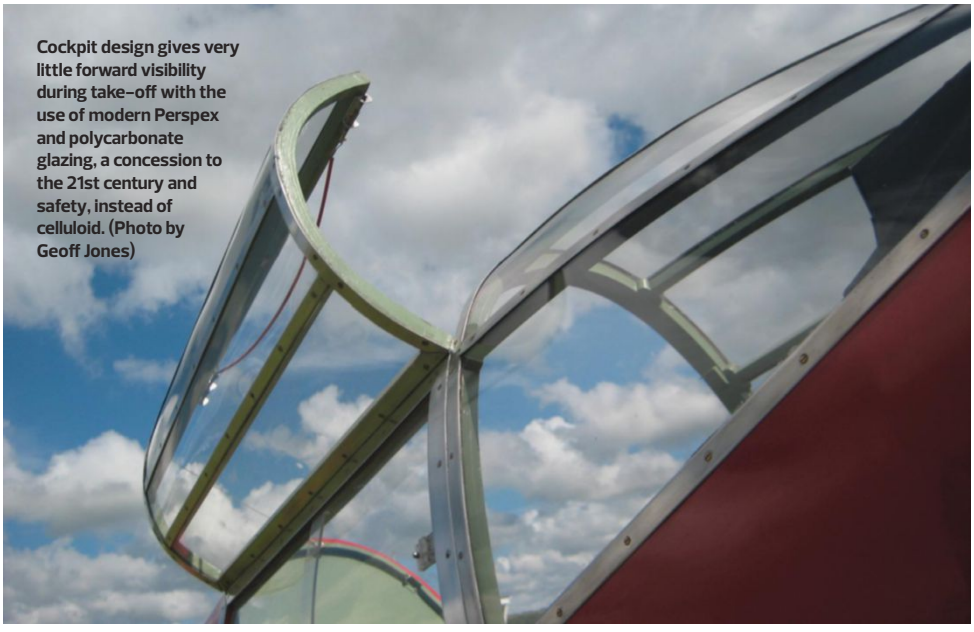
U.K. pilot and home builder David Beale wanted to replicate G-AEKL, the historic Mew Gull flown by Edgar Percival, Charles E. Gardner, and Giles Guthrie, the winner of the 1937 King's Cup, and to complement the sole survivor G-AEXF. Therefore, Beale set about building a reproduction and not a replica, following exactly 1930s' building techniques. The original G-AEKL had been flown by MacRobertson DH 88 victor Tom Campbell Black, killed in a ground collision with an Royal Air Force (RAF) Hawker Hart at Liverpool in 1936. Soon rebuilt, G-AEKL was the winner of the 1937 King's Cup at a speed of 233.7mph, and on one flight, Henshaw recorded a speed of 255mph. G-AEKL was destroyed in a Luftwaffe bombing raid, but Beale sought to re-create it in its 1937 post-rebuilt condition. The goal was made more possible when he responded to a magazine advertisement selling parts and drawings for a Mew Gull. He found the "parts": an incomplete fuselage, wing components, and, unbelievably, an unused 200hp Gipsy Queen engine still in its packing case. It was all being sold as surplus to a nonflying replica project of G-AEXF by Hawker Restorations on behalf of the RAF Museum at Hendon.

The first flight of the reproduction G-HEKL at Witchford on August 20, 2013, was a landmark for Beale's skills and the stunning Percival design. Not one piece of "plastic" was used—all wheel spats, spinner, and engine cowls being manufactured from sheet aluminum; the wings have an ash, spruce, and ply spar with dihedral, taper, and sweep; no parallel surface at all—a really complex structure. Obtaining original instruments is an ongoing quest.

A typical flight for Beale and his Mew Gull was from England's east coast near Fenland, Cambridgeshire, to its west coast in Cornwall—flight time of 1 hour and 10 minutes. It has a fuel capacity of 55 imperial gallons (66 U.S. gallons), a maximum gross weight of 1,950 pounds, a range of 1,100 miles at 200mph (10 gallons/hour), and an epic 2,000fpm normal rate of climb at 115mph. By November 2015, the Mew Gull had accumulated 90 hours, with Beale flying 80 of them, making him quite probably the high-time Mew Gull pilot alive and soon the highest ever!



With a tailskid, the Mew Gull sits low to the ground. David Beale's reproduction is finished with 32 coats of period satin dope, each hand-flatted to give the correct smooth appearance. (Photo by Geoff Jones)


Cockpit design gives very little forward visibility during take-off with the use of modern Perspex and polycarbonate glazing, a concession to the 21st century and safety, instead of celluloid. (Photo by Geoff Jones)


Forming the aluminum wheel pants for the reproduction Mew Gull was a major and time-consuming task. Every possibility to streamline was taken by designer Edgar Percival to wring extra speed from the aircraft. (Photo by Geoff Jones)

Alex Henshaw's all—white and only surviving original Mew Gull G-AEXF flying recently with David Beale's reproduction G-HEKL near Old Warden, Bedfordshire, United Kingdom. (Photo by Darren Harbar)

Below, left: Hand-beaten aluminum spinner and cowlings around its Gipsy Queen 1 engine, with minimal frontal area, contribute to the Mew Gull's sleek profile. (Photo by Geoff Jones) **Below, right:** A very compact cockpit with mainly restored contemporary instruments—the throttle is sandwiched between the prop and mixture control knobs on the left of the cockpit. (Photo by Geoff Jones)





Mk 80 Family of Bombs

A New Bomb for a New Generation

BY **BARRETT TILLMAN**

World War II was over, and the jet age was beginning. But mission-oriented planners began pondering how the new generation of aircraft might benefit from a new generation of ordnance.

To reduce drag and increase speed and fuel economy, engineers began considering new bombs and fuel tanks. One of these engineers was Edward H. Heinemann.

Largely self educated, Heinemann rose to prominence as Douglas Aircraft Company's chief engineer, producing two generations of classic combat and test aircraft, from the war-winning SBD Dauntless to the D-558 Skystreak and Skyrocket X-planes.



An F/A-18C Hornet of VFA-82 shows off its weapons load while in a vertical climb, including eight Mark 83 bombs flanked by AIM-9 Sidewinder and AIM-7 Sparrow missiles. The Hornet was designed as a true strike fighter, capable of air-to-air and air-to-ground missions. (Photo courtesy of the National Naval Aviation Museum)

Something New Was Needed

Before something new could be developed, however, there first was the matter of adequate ordnance for test purposes. In 1945, during evaluation of the AD (later A-1) Skyraider, the tail fins of a 2,000-lb. bomb separated in flight. An investigation showed that the faulty weapon dated from 1925! After consulting with the Naval Air Weapons Station at China Lake, California, Heinemann phoned the Bureau of Aeronautics and received permission to proceed with a new weapon that would fit current and projected aircraft. The U.S. Army, however, largely continued its own way with unstreamlined "fat" bombs carried internally, contrary to most carrier aircraft.

Long a master of weight reduction and internal space, Heinemann put his crew to work on finding optimal aerodynamic shapes, including underwing pylons as well as "external stores." High-speed flight testing was to be conducted on the D-558-II, the record-setting Skyrocket.

Heinemann recalled, "The Navy's weapons, since they were carried externally, had to be streamlined. We developed the Aero 1A shape for all sizes: 250, 500, 1,000, and 2,000 pounders as well as for 150-, 300-, and 450-gallon (drop) tanks. All had the same shape and thus the same drag coefficient. A fineness (length to diameter) ratio of 8.3 to 1 was chosen to fit all aircraft. It was not a supersonic design, but the airplanes with external bombs aboard weren't expected to fly that fast."

The Mk 80 Family Is Born

The resultant bomb was a 1,000-pound weapon that was 10 feet long, designated Mark 80, or Mk 80. In contrast to Korean-era "fat bombs," such as the M117 (750 lb./450 explosive), the new design was "scalable," capable of being built as small as 250 pounds and as large as 2,000 pounds with very little difference in drag quotient.

When the Department of Defense was established in 1947, a trend toward standardization began. China Lake was intimately involved in the Mk 80 program, recommending an explosive known as



The Douglas Aero 1A shape that became the Mk 80 series bomb and similar drop tanks, being tested on the D–558–2 experimental aircraft in 1954. (Photo courtesy of Dr. Richard Hallion)

Tritonal 80/20, based on its composition of 80 percent TNT and 20 percent aluminum "inhibitor," which made weapons safer for long-term storage.

Weaponeers and aircrews quickly appreciated the Mk 80's highly efficient design. The streamlined shape permitted multiple bombs to be carried on newly designed double and triple ejector racks, affording higher cruise speeds and enhanced mission range. The thin cast-steel case permitted 40 to 45 percent of the weapon weight to consist of explosives. That meant more bang for the buck—literally.

The basic Mk 80 was adapted as the Mk 81 (250 lb.), Mk 82 (500 lb.), Mk 83 (1,000 lb.), and Mk 84 (2,000 lb.). Probably the most common configuration was the Mk 82, which, like the others, could vary 5 to 6 percent in weight depending on explosive content and add-ons, such as retarded or guidance packages.

Throughout most of the United States' involvement in the Vietnam War, the large stock of previous ordnance remained in use, although the regime of Lyndon Johnson and Robert Strange McNamara had to buy back bombs from Germany to avoid an ordnance shortage. The U.S. Air Force used M118s extensively from 1965 at the start of Operation Rolling Thunder but eventually converted to the Mk 80 series.

The Family Grows

In Vietnam, the 250-lb. Mk 81 was found to be only marginally useful and was pulled from the U.S. inventory.



The life of an ordnanceman loading iron onto aircraft is captured in this image taken on the flight deck of the carrier USS *Constellation* (CV–64) as "red shirts" manhandle a Mk 80 series bomb onto an A–6A Intruder of Attack Squadron (VA) 165 during operations off Vietnam. (Photo courtesy of the National Naval Aviation Museum)



Bomb carts stacked with Mk 82 bombs pictured in front of A-6E Intruders of Attack Squadron (VA) 196 on the flight deck of the carrier USS *Coral Sea* (CV-43) operating in the Indian Ocean in 1980. During this cruise, the carrier provided support for Operation Eagle Claw, the failed rescue of Americans held hostage in Iran. (Photo courtesy of the National Naval Aviation Museum)

Following three disastrous shipboard fires during the Vietnam War, the Navy took additional protective measures by applying a fire-retardant coating to inhibit "cook-offs," or secondary explosions, aboard aircraft carriers. Thus, the rough surface identifies naval ordnance in comparison to smooth Air Force weapons.

The Heinemann weapon had "stretch." It was easily adapted to the Snakeye retarded bomb with four pop-out "petals" to slow its speed, allowing fast, low-level delivery without risk to the aircraft, and in the Paveway series, it became a laser-guided weapon. Among other variants, the Mk 82 also became the warhead for GBU-12 Paveway II laser-guided bombs, introduced in the mid-1970s.

With GPS targeting, the GBU-38 Joint Direct Attack Munition (JDAM) used the Mk 82 as another precision weapon's warhead. First used in NATO operations against Yugoslavia in 1999, JDAMs could be launched as far as 15 miles from the target.

Mark 84s have proven extremely effective in the GBU-15 configuration with electro-optical guidance. Developed in the post-Vietnam era, the weapon was employed by F-111s during Operation Desert Storm.



During most of its service, Attack Squadron (VA) 196 was nicknamed the "Main Battery," with clusters of Mk 82 bombs serving as the main battery on this squadron A-6E Intruder during a 1986 flight. (Photo courtesy of the National Naval Aviation Museum)

A Satisfying Achievement

In his 1978 memoir, Ed Heinemann said, "As I write this almost 30 years after the decision was made, bombs and fuel tanks have been made by the thousands in all sizes with the Aero 1A standard design. My colleagues and I have derived as much satisfaction from this endeavor as we have from any one airplane."



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The Medal of Honor Mess

Sorting through Problems with Our Highest Award

BY **BARRETT TILLMAN**

The military awards and decorations system is broken. The Medal of Honor (MoH) is the prime example because of service agendas, insider influence, and political patronage.

But we should remember that MoH recipients do not make the rules, although a few have influenced them. Eddie Rickenbacker lobbied Congress for years before receiving his.

Only in 1963 did the Department of Defense adopt a unified standard for all services. Presently, the requirement is for combat with an enemy of the United States in which the recipient "distinguished himself conspicuously by gallantry and intrepidity at the risk of his life above and beyond the call of duty."

DESPITE THE LOSS OF HIS LEFT ARM, HE TENDED TWO WAIST GUNNERS, WHO HAD MULTIPLE WOUNDS ... BOTH SURVIVED. JOE SAWICKI DID NOT.

So what exactly is considered "above and beyond"?

Of the dozen or so MoH men I've known, few considered that they had done anything exceptional. "Washington needed a hero," said one, while another conceded, "Most of us were just in the right place at the right time."

About 100 aviation-related MoHs have been awarded since 1918. Dozens more could have been presented.

Consider the following case:

Near Bremen, Germany, in November 1943, a 303rd Bomb Group B-17 was stricken by flak, severely wounding Staff Sgt. Joseph Sawicki. Despite the loss of his left arm, he tended two waist gunners, who had multiple wounds. The 20-year-old flier buckled chest-pack parachutes to both men, dragged them to the exit, opened the hatch, and shoved them overboard. Both survived. Joe Sawicki did not.



Army Air Force Staff Sgt. Joseph Sawicki, son of Polish immigrants, receives the Polish Cross of Valour for his WW II service in the Royal Air Force prior to the AAF. Killed in action in November 1943, he was nominated for the Medal of Honor by the pilot of his B–17 in 1945, 1947, and frequently thereafter. He only received the Purple Heart. (Photo courtesy of the Sawicki family)

Upon liberation, the surviving crewmen submitted recommendations that Sawicki receive the MoH. The U.S. Army lost the first set of papers, so the crew resubmitted them two years later. The Army apparently bungled that set, too. Nonetheless, the pilot, Lt. Carl Fyler, fought a decades-long battle with the Army bureaucracy to get Sawicki something more than the Purple Heart. In 2009, Fyler died frustrated and angry—Big Army consistently found excuses to ignore or refuse the request.

Against all logic, the Army retains control of who receives the MoH for the Army Air Force (AAF) from World War II. One Army aviator who earned the MoH in Vietnam said, "If the blue suits had control, that young man would have [received] the Medal long ago."

One excuse the Army trotted out is that the MoH requires a living witness. Both gunners Sawicki saved died in the 1970s, but the military's aversion to awarding the MoH to him does not stand up. Numerous MoHs have been awarded to deceased soldiers from WW I and the Civil War without living witnesses. Clearly there's something more at work here—apparently a deep-rooted institutional inability to admit a scandalous wrong.

Other valorous actions received service crosses from WW II through Vietnam and into the present, although the Air Force seems prejudiced against non-pilots. Frequent *Flight Journal* contributor Robert F. Dorr notes, "No airman has yet received the nation's top award for valor for action in Afghanistan, but Robert Gutierrez's combat action is similar to two actions by enlisted airmen in Southeast Asia in the 1960s that earned the top award."

In October 2009, Air Force Staff Sgt. Gutierrez clearly went above and beyond in Afghanistan. As a combat controller attached to a Green Beret team hunting a Taliban commander, he recorded a feat that puts many MoH actions in the shade.

Amid a four-hour firefight, Gutierrez personally killed enemy fighters and repeatedly called in A-10s "danger close." Despite grievous wounds—he lost half his blood and sustained a collapsed lung—the controller stayed in the fight. Although lapsing in and out of consciousness, he remained on the radio, directing jets for his heavily outnumbered team, averting any American deaths. He spent nearly two years recovering and finally received the Air Force Cross.

The MoH has been awarded for vastly less.

Military historian and critic John Gresham says, "The first requirement for a Medal of Honor should not be a death certificate." But that was, in fact, the requirement under President George W. Bush, who presented no MoHs to living recipients for Afghanistan or Iraq.

What to do?

The military services cannot be trusted to apply criteria equitably or fairly, so Congress must get involved. Especially urgent is giving WW II airmen a fair chance, so Congress needs to free the Air Force from the Army's onerous control over AAF medals.

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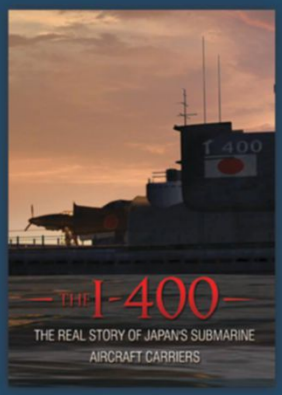
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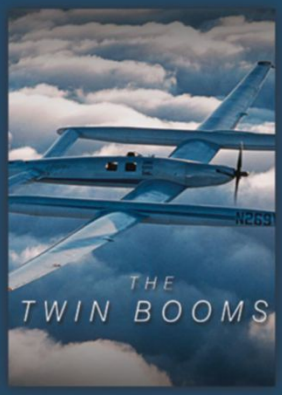


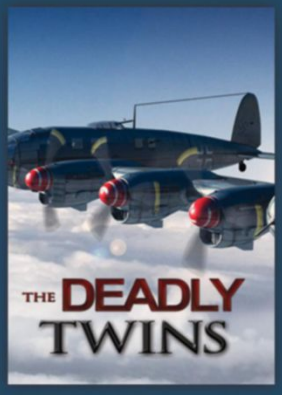




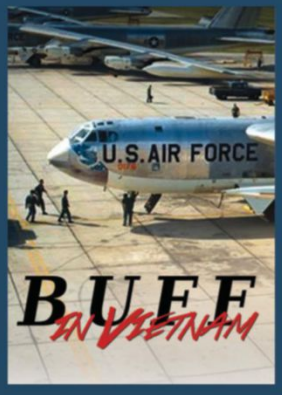














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